

COUNTY OF CAMBRIDGE

THE FIRST REVIEW
of the
TOWN MAP FOR CAMBRIDGE

STUDY PAPER NO. 1

AN APPRECIATION OF THE
CAMBRIDGE TRAFFIC PLAN

County Planning Department
Shire Hall, Cambridge

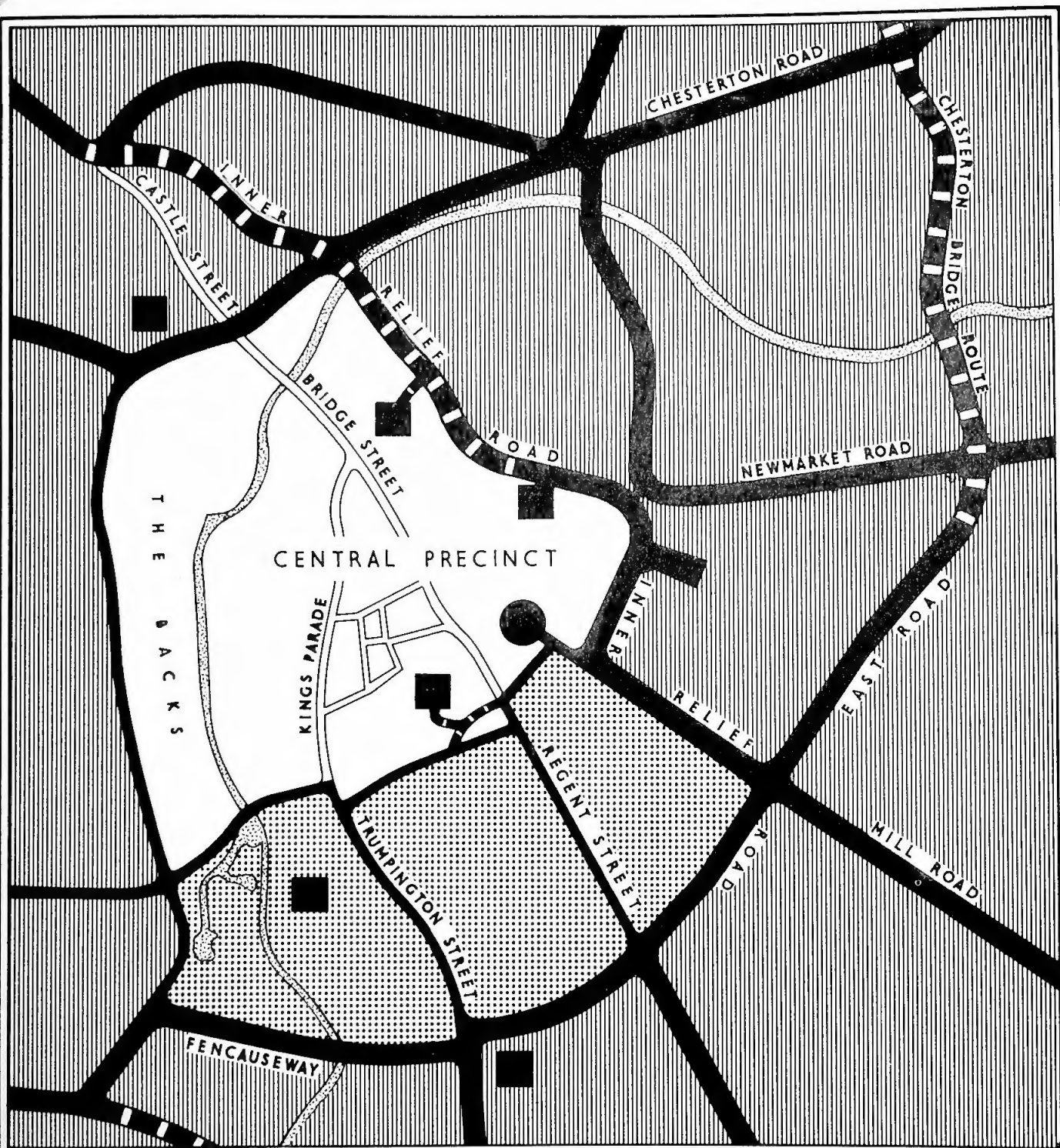
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THE FIRST REVIEW
of the
TOWN MAP FOR CAMBRIDGE

STUDY PAPER NO. I

AN APPRECIATION OF THE
CAMBRIDGE TRAFFIC PLAN



CENTRAL PRECINCT

CAR PARKS. . .	■	MAIN ROADS. . .	—	Existing	Proposed
BUS STATION. . .	●	ACCESS ROADS. . .	- - -		

This Report is a summary of the findings of Messrs. R. Travers Morgan and Partners, Consulting Engineers, who were appointed by the Planning Authority to assist in the preparation of evidence for the Inquiry into the First Review of the Town Map for Cambridge. The Report is drafted by the Consultants following their re-examination of the traffic and parking studies previously carried out by the County Planning Department.

FOREWORD

The road and traffic proposals of the Development Plan for Cambridge have been the subject of controversy ever since they were first made public in 1950 in the report "Cambridge Planning Proposals" prepared by Sir William Holford and Professor H. Myles Wright. Sir William's recommendations were incorporated in the statutory Town Map, with only minor changes. At the first Public Inquiry in 1952, the greater part of the long hearing was occupied with arguments directly or indirectly related to the traffic aspects of the Plan. The strongest objections were made to the proposals for the relief of congestion in the Central Area and particularly to the proposed Spine Relief Road around the eastern side of the centre. The Minister approved the Plan in 1954, including all the road proposals but made a reservation that the Spine Relief Road should be considered again at the First Review of the Plan in the light of further traffic studies.

In the following years traffic volumes grew at an increasing rate, while no progress was made on any part of the road proposals and congestion became serious. Meanwhile the County Planning Department carried out repeated studies of the problem, including a large scale Origin and Destination Census in 1956 and detailed surveys of Parking in and near the Centre. These confirmed earlier studies and satisfied the Planning Authority that the original proposals were still sound and offered the best practicable solution to the problem as a whole.

This was the situation when the proposals again became the subject of argument at the Public Inquiry into a scheme for the redevelopment of the Lion Yard Area in 1959. This was an area of about $7\frac{1}{2}$ acres which in the Minister's letter of approval he had suggested should be redeveloped at an early date. The already serious congestion, together with the uncertainty left by the Minister's decision as to the future of the Spine Relief Road, gave added weight to the case of the objectors, particularly the University, who were opposed to any expansion of commercial development in the historic centre. They claimed that the improvement of commercial facilities would only aggravate the problem. The Planning Authority believed that in the context of the traffic plan as a whole, and the concept of the Central Precinct, this was not so, but as the Inquiry was concerned only with the redevelopment scheme, the overall proposals for the centre did not form part of the proposals presented. It was assumed at that time that the principles of the Plan, including the creation of a Central Precinct, were officially accepted.

The Minister's decision on the Lion Yard redevelopment, issued in 1960, did nothing to clarify the position. He did not approve the scheme, apparently accepting much of the objectors' case that there should be no commercial expansion in the centre. At the same time, however, he indicated that he viewed with approval the road and car parking proposals and also the redevelopment of the Central Area subject to certain conditions.

The first Review of the Town Map for the City of Cambridge as a whole was submitted in May, 1961. Confirmed by the traffic studies, the road and parking proposals were essentially the same as in the Approved Plan, though with some important modifications of detail. It was intended that the scheme for the Lion Yard would in due course be revised to meet the Minister's views, but within the same broad framework of the Plan as a whole.

The University, however, put a different interpretation on the Minister's decision on the Lion Yard. They took it as a signal for a renewed attack on the whole basis of the Plan. As part of their objection to the Review they put forward counter-proposals involving the development of a major new regional shopping centre in the City Road area, east of the historic centre, with alternative road and parking proposals. These were of such a radical nature that they constituted a completely new plan for the City.

In view of this objection it was clear that evidence on traffic would be of great importance at the Public Inquiry into the Review proposals, not only for the purpose of supporting the Plan proposals but also for the evaluation of the University's counter-proposals.

The Planning Authority therefore decided to seek a second opinion on the traffic aspects of the Review and in November 1961 invited Messrs. R. Travers Morgan & Partners, Consulting Engineers, to undertake this task.

This report is a summary of the Consultants' findings and is presented jointly by Messrs. R. Travers Morgan & Partners and The County Planning Department. The drafting of the report is the work of the Consultants.

The Planning Authority record with appreciation the help and advice received from the Consultants. Particularly Mr. A. Goldstein, the Partner responsible for the Cambridge project, and who subsequently gave evidence at the Public Inquiry. Also, to his Chief Assistant, Mr. R. L. Wilson, on whom fell the task in the first place of assimilating and evaluating the survey work previously undertaken by the Planning Department.

Miss Betty Yule of the Planning Department has been responsible for designing and supervising all the traffic and parking surveys made since 1952 and for the preparation of the subsequent reports. It is on these data that much of the report that follows is based.

W. L. WAIDE
County Planning Officer

Cambridgeshire County Council,
County Planning Department,
Shire Hall, Castle Hill,
CAMBRIDGE.

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SUMMARY AND CONCLUSIONS

Paragraph
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The Policy

The fundamental principle on which the Development Plan is based is that Cambridge shall remain predominantly a University Town. This means that most of the Plan proposals are directed towards the preservation of the character of the City and particularly of its historic Central Area.

2.01

The application of this policy to the traffic problem implies that there is no question of the demands of motor traffic dictating the form of the Plan, such that the historic centre becomes a "universal drive in". Instead it has led to the principle of positive control of traffic. Thus it is proposed that there should be certain physical and economic controls of traffic movement and parking so that new road and parking facilities, while sufficient for the controlled demand, will be of a scale in keeping with the traditional character of Cambridge.

2.02

The essence of the proposals is the creation of a Central Area Precinct from which all non-essential traffic will be removed leaving the area better able to serve its functional position as a shopping, commercial, recreational and cultural centre, not only for the City, but for the area for which Cambridge is the capital. The intention is to make this Precinct a traffic-free area eventually. The first stage will reduce the traffic by about half and this amount will not be affected by any Central Area redevelopment as the facilities and controls will be designed to set an upper limit to the number of vehicles brought into the centre at any one time.

2.03

Summary of Main Findings

An analysis of the traffic volume and parking surveys in the four year period 1956-60 shows that the average increase in traffic and parking in Cambridge has been about 30% or 6.8% per annum compound.

8.03

Cambridgeshire already has a high ratio of vehicles per head of population - 0.259 in 1960 compared with the National Average of 0.185. The County is thus nearer saturation level and this probably accounts for the fact that the growth rate of traffic is slightly less than the National Average.

8.01

The ratio of the peak hour (5-6 p.m.) to the average hour traffic flow in the period 8.30 a.m. - 6 p.m. has been increasing. This would indicate that the travel pattern is changing and that more people are using their cars to travel to work. If this trend continues, peak hour congestion will grow steadily worse and the demand for all-day parking space will increase at a greater rate than the demand for parking of lesser duration.

9.04

Increased parking and traffic loads on the Central Area streets have given rise to severe congestion such that journey times through the centre have been steadily increasing. In spite of these traffic conditions the 'spine' route is still attractive particularly for local through movements in the north-south direction. 31% of the traffic on the streets in the Central Area has no business in the centre (Zone Z Figure 3)

6.03

9.12

Observations of the reduction of parking and traffic flow on Thursdays in term and out-of-term have indicated that people coming into Cambridge to shop make up about 25% of the stopping trips to the centre and take up about 25% of the parking space. The University, in term, absorbs about 11% of the parking space.

10.21

The results of the 1956 Origin and Destination Survey are confirmed as being representative of the pattern of traffic

movements in Cambridge today. 69% of all trips entering the Census Area stopped in Zone Y or Zone Z (Figure 3). 68% of all river crossings were associated with an origin or destination in Zone Y or Zone Z. This evidence confirms that a very important part of any traffic plan must be to provide a road system capable of distributing trips terminating in Zones Y and Z.

In the most congested part of the centre (Zone Z) no relief can be expected by the provision of outer by-passes. The non-stopping traffic through this Zone is mainly local traffic trying to reach a destination in Zone Y. The problem is one of providing a new facility or facilities which will distribute these movements and act as an inner by-pass to the Central Area.

It is probable that any traffic at present using the 'Spine' as a direct route through the centre for a non-stop journey, which may be attracted to some new facility to be provided, would be almost immediately replaced either by traffic which is at present deterred by the congestion or by an increase in the present pattern of movements whose 'free' growth has been inhibited by the congested conditions. The future traffic plan must, therefore, include positive steps to prevent through movements in the North-South direction from passing through the Central Area.

Uncontrolled parking in Cambridge at present restricts traffic movements on the streets, gives rise to delays which cause big variations in journey time and generally creates an environment which is not in keeping with the traditional centre of Cambridge. The parking facilities in the City Centre (Area 1 Figure 7) and in combined Areas 1 and 2 (proposed meter Zone) are already saturated. In this context "saturation" refers to peak hour saturation and the area and period in the day over

been carried out.

The proposed New West Road, whilst providing negligible relief to the City Centre, would enable the intended plan for minimising vehicular traffic on the Backs road to be implemented. It can therefore be recommended, though not as a matter for high priority.

The proposed Chesterton Bridge scheme is of the highest priority. This is due not only to its own traffic relieving effect, but also as a pre-requisite to the solution of the Central Area problem. Preliminary work on the scheme has already been started, but it is unlikely that the new river crossing will be open to traffic before 1966. If Chesterton Bridge is the first new facility constructed, the traffic on the existing river crossing routes will be reduced as follows -
Victoria Avenue 50%: Magdalene Bridge 9%: Queens Road 16%: 18.02

The Inner Relief Road is the main new traffic facility which will provide the capacity necessary for the relief of traffic in the Central Area. The Inner Relief Road will have the following manifold functions.

- (i) To provide canalized access to the Central Area.
- (ii) To distribute between the access points traffic to the Central Area streets and car parks.
- (iii) To relieve the Central Area streets of non-stopping through traffic (both inter-regional and local).
- (iv) To act as a distributor road for local traffic stopping in the South-East fringe area adjacent to the centre. 19.02

The construction of a dual carriageway over the whole route of the Inner Relief Road would not be consistent with the policy of the Development Plan to maintain the traditional character of the University Town. It is considered that the planning policy and physical limitations of the route dictate that the new river crossing and that part of the Inner Relief Road along Jesus Lane should be limited to a single carriageway

of modest proportions, i.e. there should be no need to widen Jesus Lane. Consequently controls must be applied to these sections and additional capacity provided elsewhere such that this part of the Inner Relief Road acts in a reduced capacity and in particular will be relieved of the east-west river crossing movements. The basic control is the prohibition of direct access from Newmarket Road to Jesus Lane by the construction of the Newmarket Road - King Street Underpass. The additional capacity between Chesterton Lane and Four Lamps is provided by the improvement of the Victoria Avenue route.

19.05

19.06

19.07

The Northern part of the Inner Relief Road (from Histon Road to Jesus Lane) is a pre-requisite to the solution of the Central Area traffic problems. It will result in a minimisation of traffic in the Central Area without seriously reducing access facilities and could pave the way for the ultimate emergence of a Central Precinct used essentially by pedestrians. The provision of this part of the Inner Relief Road is thus a matter of the highest priority.

19.13

The improvements to the Southern sections of the Inner Relief Road, particularly those associated with Emmanuel Road and Parkside, should be phased with the construction of the Northern sections if either part is to function as planned. Dual carriageways will be required on Gonville Place, together with some improvement of the Hills Road, and Mill Road junctions, by 1968. The remaining sections Emmanuel Road, Parkside and Lensfield Road, will require dual carriageways in the period 1974 to 1978.

19.19

19.21

19.25

A new road from Four Lamps to Gonville Place following a route to the east of New Square and the Brooklands Avenue Link are proposals for additional facilities which would reduce the intensity of traffic on the Southern sections of the Inner Relief Road. These must be given serious consideration if the

19.23

environment associated with the Inner Relief Road as a heavily trafficked dual carriageway facility, particularly along the line of Emmanuel Road and Parkside, is not in keeping with the policy of the Plan to maintain and enhance the existing character of Cambridge as a University Town.

19.24

The construction of New Emmanuel Street will make possible a system of one-way streets which would ease the movement of vehicles from several directions of approach wishing to enter the Lion Yard car park in the City Centre. New Emmanuel Street will also form an important link in a distributive route defining the Southern boundary of the area which may eventually be turned into a pedestrian Precinct.

20.09

The successful implementation of the policy to raise the standard of environment of the Historic Centre, by a major reduction in the intensity of traffic and parking, depends on the positive control of non-essential movements and parking and their diversion to alternative traffic facilities which have sufficient capacity to cater for them. The road and parking proposals provide these alternative facilities. The closure of Magdalene Bridge, associated with some form of further deterrent for local North-South movements on the Precinct Area streets form the basis of the necessary traffic controls.

20.01
to
20.04

Best use will be made of the Parking Facilities in the proposed meter controlled zone if the space available is reserved for short-term parkers. This can be achieved by the strict enforcement of the parking regulations and by very high charges for parking longer than 4 hours. The nature of the resulting demand for short-term parking in the meter controlled zone, assuming a reasonable level of occupancy, leads to relatively high turnovers for the parking spaces on the streets and in the car parks. The movements associated with the high turnover figures must be catered for in the design of the parking

13.05

13.11

facilities. The entrances and exits, the pedestrian movements lighting, parking area, and method of operation must all be designed with the object of meeting the specific demand to be served.

13.13

If the substance of Cambridge is considered to be an area bounded by the River Cam in the North, Queens Road in the West and the general line of Fen Causeway, Lensfield Road, Gonville Place, East Road and Chesterton Bridge in the South and East, then the estimated ultimate parking demands total 6,600 spaces. To this 650 spaces (10%) have been added on an extremely long term basis to cater for peak fluctuations on Saturday parking. This results in a total demand within that area of 7,250 spaces, which demand the Development Plan can meet.

13.19

The essence of the successful implementation of the parking proposals is that they should be flexible and based on continued surveys and studies during the progressive construction of the parking facilities.

W. L. Waide
County Planning Officer,
Cambridge.

A. Goldstein (Partner)
R. Travers Morgan & Partners,
Consulting Engineers, London.

ADDITIONAL SUMMARY BY CONSULTANTS

We consider that the Planning Authority has carried out a very great amount of traffic work by way of surveys, studies and analysis since 1948.

This traffic work, together with the comparatively lesser amount of fieldwork by ourselves (also certain fieldwork by Messrs. Atkins,) has provided data which is fairly comprehensive. Such gaps in the data as exist (see ^{page xii} ~~paragraphs 27.02 and 27.03~~) can be filled in the future. The massive amount of data

available is, on the whole, consistent, describes adequately the existing traffic situation and, in the form now prepared, can be readily used to test the adequacy of any future road proposals.

In so far as this report is to serve as a "second opinion" on the traffic work by the Planning Authority, we can state that, as far as we know, there is no question of substance on which there is a difference of view between us.

The principles of the traffic provisions envisaged in the Development Plan are, in the main, consistent - so far as traffic is concerned - with the basic intention of the Plan. The details of the provisions require some modifications and the implementation of certain proposals must be the subject of careful design studies. We are satisfied that the proposed traffic provisions, as developed in this Report, will meet all foreseeable traffic contingencies arising from the implementation of the Development Plan.

A. Goldstein (Partner)

R. Travers Morgan & Partners,
Consulting Engineers, London.

PART I - INTRODUCTION

1. CONSULTANTS TERMS OF REFERENCE

1.01. At the request of the County Planning Committee the Consultants were asked to:

- (a) re-examine the traffic survey material available and to retabulate the results in a flexible form which would also be suitable for a proper evaluation of the University's traffic proposals.
- (b) carry out an independent assessment of the road and car parking proposals of the Development Plan in the light of the policy for the control of traffic and preservation of the character of Cambridge.
- (c) advise on the general alignment, width, type of intersection and approximate cost of all the main road proposals in the Plan.
- (d) co-operate with Messrs. W. S. Atkins, the University's Traffic Engineering Consultants, with a view to limiting the field of disagreement between the County and the University on the traffic aspects of the Plan before the Public Inquiry.

1.02. The following interim reports were submitted after the Consultants had re-examined the traffic data available and completed additional tabulations:

- (i) Interim Report No.1 Evaluation of the Origin and Destination Survey 1956 - dated 12th March 1962.
- (ii) Interim Report No.2 Journey Time Surveys - dated 13th March 1962.
- (iii) Interim Report No.3 Traffic Volumes - dated 20th March 1962.

Further tabulations of the results of the parking survey were submitted on 28th March. This report includes summaries of the above interim reports.

2. SUMMARY OF DEVELOPMENT PLAN POLICY

2.01. The fundamental principle on which the Development Plan is based is that Cambridge shall remain predominantly a University Town. This means that most of the Plan proposals are directed towards the preservation of the character of the City and particularly of its historic Central Area.

2.02. The application of this policy to the traffic problem implies that there is no question of the demands of motor traffic dictating the form of the Plan, such that the historic centre becomes a "universal drive in". Instead it has led to the principle of positive control of traffic. Thus it is proposed that there should be certain physical and economic controls of traffic movement and parking so that new road and parking facilities, while sufficient for the controlled demand, will be of a scale in keeping with the traditional character of Cambridge.

2.03. The essence of the proposals is the creation of a Central Area Precinct from which all non-essential traffic will be removed leaving the area better able to serve its functional position as a shopping, commercial, recreational and cultural centre, not only for the City, but for the area for which Cambridge is the capital. The intention is to make this Precinct a traffic-free area eventually. The first stage will reduce the traffic by about half and this amount will not be affected by any Central Area redevelopment as the facilities and centres will be designed to set an upper limit to the number of vehicles brought into the centre at any one time.

2.04. Within the Central Area there now exist all the important commercial and other uses, including the department stores, the high turnover shops such as Marks and Spencers, the high quality shops, the theatre, the Guildhall, the headquarters of all the banks, those of a number of insurance offices, building societies, solicitors and accountants and a host of other uses and services.

2.05. In this area there is a close inter-mixture of gown and town.

2.06. To the edge of this area, and on the inner side of the proposed Inner Relief Road, is the Bus Station which brings conveniently to within a few yards of the centre, and from all quarters of the County, a large weekly flow of shoppers

and others seeking the services the City provides.

2.07. The Plan also proposes the establishment of three car parks, on the inner side of the Relief Road, which will provide part of the parking needs of those visiting the centre by car.

2.08. The parking proposals as a whole, however, envisage a close relationship between the parking meters in the street which will serve most of the short-period parkers; the inner car parks to meet the balance of the short-term demand and the needs of those wishing to stay a longer period, up to say 4 hours; and outside the Central Area, facilities for those wishing to stay for longer periods, many of whom would be employed within the Central Area.

2.09. A future extension of the parking arrangements provides for car parks within the middle ring or on the outer edge of the town to be linked with the Central Area by a frequent shuttle bus service, the charge for which may be included in the parking ticket.

2.10. The inter-relationship between the different types of parking needs will allow for a wide distribution over the City area as a whole and the policy of "interception" will thus reduce the traffic generated on the roads leading to and from the City centre.

2.11. Within the Central Precinct there will be ample opportunities for the steady and gradual redevelopment of the area to provide for all the foreseeable Central Area needs both commercial and social. This process of redevelopment has continued over the past few years and there is no reason to suggest that it will be arrested in the future; the reverse appears to be the case because there is evidence of the willingness of owners and others to carry out substantial redevelopment to meet the changing needs.

2.12. The Central Area is the main shopping area within the City but the proposals of the Plan also provide for the maintenance of the secondary shopping centre in the Fitzroy Street area where some redevelopment has already taken place.

2.13. In addition the Plan provides for and will encourage the improvement of the suburban shopping centres where household needs can be obtained conveniently. Certain of these centres and others not shown on the official Plan will provide for a wider range of goods. They will be of a standard capable of serving an area larger than the immediate suburbs and will include substantial parking provisions.

2.14. Outside the City and within the County, the Planning Committee envisage the establishment of improved shopping centres within the expanding villages.

2.15. This wider distribution of what the Americans call "convenience goods shopping" will make possible the better use of the Central Area of the City for the more important higher quality and higher priced goods and services, but within the context of the whole Plan it is not envisaged that the changing shopping habits will require a substantial increase in the area allocated for shopping.

2.16. The basic policy of the Development Plan is severely to restrict the introduction of new industries into Cambridge, to slow down the rate of growth and to limit the population of the City itself to about 100,000 persons. Although Cambridge has always performed an important function as a county town, it is not the policy of the Planning Authority to encourage the expansion of this activity in a manner which will compete with other towns surrounding Cambridge, such as Kings Lynn, Bury St. Edmunds, Bedford, Peterborough and Norwich. Rather, is it hoped - and expected - that those towns will themselves expand and improve their facilities so that they will rival Cambridge as attractive centres.

2.17. The concept of the function of the Central Area is that of a steadily improving but not enlarging area, maintaining the character and domestic scale of the City. In particular, it is hoped that redevelopment will keep approximately the same height and density as that which now obtains, and, with the provision of the Inner Relief Road and the positive control of non-essential movements, the streets within the Central Precinct will be retained in their present form and to their present scale.

PART II - TRAFFIC INFORMATION

3. TRAFFIC SURVEYS

3.01. The results of the following traffic surveys have been considered in the assessment of the Plan proposals. Except where noted, all the surveys were carried out by the County Planning Department.

3.02. Traffic Volumes.

<u>Date of Survey</u>	<u>Extent</u>	<u>Duration</u>
1948 May - June	14 points within City	8.30 a.m. - 6 p.m.
October	8 points on City B'dy.	7 a.m. - 6 p.m.
1950 Oct. - Nov.	8 points on City B'dy.	7 a.m. - 6 p.m.
1951 May - June	16 points within City	8.30 a.m. - 6 p.m.
Oct. - Nov.	10 points on City B'dy.	9.30 a.m. - 12.30 p.m.
1953 Oct. - Nov.	10 points on City B'dy.	7 a.m. - 6 p.m.
1956 May - June	22 points within City	8.30 a.m. - 6 p.m.
May	20 points O & D Survey	2.0 p.m. - 6 p.m.
Oct. - Nov.	10 points on City B'dy.	9.30 a.m. - 12.30 p.m.
1958 May - June	37 points within City	8.30 a.m. - 6 p.m.
Oct. - Nov.	10 points on City B'dy.	9.30 a.m. - 12.30 p.m.
1959 Oct. - Nov.	9 points on City B'dy.	8.30 a.m. - 12.30 p.m.
1960 May - June	24 points within City	8.30 a.m. - 6 p.m.
1961 August (1)	4 points on City B'dy.	6 a.m. - 10 p.m.

(1) Ministry of Transport National Census.

3.03. Junction Counts.

<u>Date of Survey</u>	<u>Extent</u>	<u>Duration</u>
1949 Sept.-Oct.	17 Junctions within City	Lunch time peak hour
1959 July	5 Junctions Central Area	Selected ½ hour peak periods

3.04. Origin and Destination Surveys.

<u>Date of Survey</u>	<u>Extent</u>	<u>Duration</u>
1948 October	Interview Survey. City Boundary.	7 a.m. - 6 p.m.
1951 May	Registration No. Survey Central Area.	1.30 p.m. - 4.30 p.m.
1956 May	Registration No. Survey. Inner and Outer cordon of census points round City Centre.	2 p.m. - 6 p.m.
1960 April	Registration No. Survey. Magdalene Bridge incoming traffic only.	8.30 a.m. - 9.30 a.m.

3.05. Journey Time Surveys.

<u>Date of Survey</u>	<u>Extent</u>	<u>Number of Measurements</u>
1956 May (2)	Main Routes covered by O and D survey.	19 links between major intersections, 9.7 miles, 56 runs per link.
1958 August	Huntingdon Road - Hills Road	3 routes 5.2 miles 16 runs total.
1959 February (2)	Huntingdon Road - Hills Road	1 route 2.4 miles 16 runs total.
1960 October (2)	Huntingdon Road - Hills Road	5 links 2.4 miles 28 runs per link.
1960 December (2)	Huntingdon Road - Hills Road	5 links 2.4 miles 10 runs per link.
1961 August (3)	Huntingdon Road - Hills Road	3 links 2.4 miles 6 runs per link.
1961 November (3)	Hills Road - Huntingdon Road	3 links 2.3 miles 5 runs per link.
1962 Feb./March (4)	All traffic routes affected by the Plan.	54 links 23.2 miles 6 - 36 (average 14.5) runs per link.

- (2) Survey by City Police
- (3) Survey by Miss Maltby, Cambridge Daily News
- (4) Survey by the Consultants.

3.06. Parking Surveys.

<u>Date of Survey</u>	<u>Extent</u> *	<u>Type of Survey</u>
1949 January	Area 1 and 2	Friday, Sat. Peak Accumulations.
1956 July	Areas 1, 2 and 3	Thursday, Friday, Sat. Peak Accumulations. Av. Weekday Duration 8 a.m. - 6 p.m.
1959 July	Areas 1, 2 and 3	Thurs., Fri., Sat. Peak Accumulations. Av. Weekday Duration 8 a.m. - 6 p.m.
1961 Feb./March (2)	Main streets only of Areas 1 and 2	Av. Weekday Duration 9 a.m. - 6 p.m.
1961 October	Areas 1, 2 and 3	Thurs., Fri., Sat. Peak Accumulations.
1961 December (2)	Area 1 and 2 streets	Sat. Peak Accumulation.
1962 January (2)	Area 1 and 2 streets	Sat. Peak Accumulation.

* See paragraph 7.05

<u>Date of Survey</u>	<u>Extent</u>	<u>Type of Survey</u>
1962 February (5)	Areas 1, 2 and 3 and City Road Area	Thurs., Fri., Sat. Peak Accumulations.
1962 March (2)	Area 1 and 2	Thurs., Fri., Evening Accumulations.
1962 April (5)	Areas 1, 2 and 3 and City Road Area	Thurs., Fri., Sat. Peak Accumulations.
1962 April (6) (a few preliminary results only)	Area 1 and 2	Survey by Post of effect of Economic Parking Controls.
(2) Survey by City Police (5) Survey by Messrs. W.S. Atkins and Partners, Consulting Engineers to University. (6) Survey by Department of Applied Economics, University of Cambridge.		

4. ANALYSIS OF TRAFFIC VOLUME SURVEYS

Measurement of Traffic in Vehicle Miles

4.01. From the results of the traffic volume surveys, past growth trends were established to assist in the estimation of future traffic growth rates.

4.02. For the traffic in the Central Area and the main routes forming an Inner Ring round the centre, sufficient counts were available at representative points for the traffic in these two areas to be measured in vehicle miles. The roads included in the Central Area and Inner Ring are shown on Figure 1.

4.03. The measurement of traffic by vehicle miles weights the value of each traffic count at a point by the length of road over which the count is representative. The product of a traffic count in vehicles at a point and the length in miles of the road over which the traffic volume measured does not materially alter is the vehicle mileage measurement of traffic on that road. Total traffic on a network of roads in an area may be expressed as the sum of vehicle miles measured on each section of the network. The growth of traffic in the area may be expressed as the change of the total vehicle mileage in the area.

This method of measurement of traffic growth in an area avoids the possibility of introducing a bias to the area growth figure. Such a bias can arise when a large growth at a census point, applicable to only a short section of road, is given equal significance to the same growth at a point representative of a much longer section.

Central Area and Inner Ring

- 4.04. For the Central Area and Inner Ring the volume of traffic on a vehicle mileage basis was calculated from surveys in the five years 1948, 1951, 1956, 1958 and 1960, based on an average hourly flow as determined from 9½ hour counts (8.30 a.m. to 6 p.m.) in the months of May or June. The seasonal variation of traffic flow between May and June was not considered to be significant.
- 4.05. Measurements of vehicle miles in the Central Area were based on traffic counts at 12 points and covered 2.91 miles of major streets.
- 4.06. In the Inner Ring the results of counts at 9 points were available and the vehicle mileage measurement covered a total of 3.23 miles of major roads.
- 4.07. Counts which were not on the basis required (paragraph 4.04) were converted to equivalent flows. At certain points counts were not available for each of the five years and the missing flows were interpolated by inspection.
- 4.08. The average hourly flows used for the vehicle mileage calculations for the Central Area and Inner Ring are summarised in Table 1.

City Boundary

- 4.09. The traffic counts available on the outer radial roads which lead to the Inner Ring and the Central Area and which make up the rest of the pattern of main traffic routes in Cambridge were considered to be insufficient for a reliable measurement of vehicle mileage.
- 4.10. The growth trend of the sum of the average hourly traffic volumes at the City boundary has however been examined on the basis of the 9.30 a.m. - 12.30 p.m. counts in October or November.

Summary of Growth Trends

- 4.11. The results of the growth analysis of traffic volumes are summarised in Table 2 and compared with the National trend.
- 4.12. In the three year period 1948-51 traffic growth in the Central Area (8.6% per annum) and on the Inner Ring (10.3%) was greater than the growth on the City boundary (6.8%).
- 4.13. In the five year period 1951-56 the growth within Cambridge dropped considerably (Central Area 1.2% per annum: Inner Ring 2.8%) whilst that on the boundary maintained approximately the same rate as in the previous period (7.2%). This may be due to inhibition caused by congestion in the Central Area.

- 4.14. In the two year period 1956-58, the position was reversed as the rate of growth in the Centre (5.5%) and Inner Ring (7.5%) increased and that on the boundary decreased to 2.6% per annum.
- 4.15. In the two year period 1958-60, growth within the City (Central Area 6.7%, Inner Ring 8.3%) has been similar to that on the boundary (7.5% to 1959).
- 4.16. The rate of growth of traffic entering Cambridge has been less than the National average except in the period 1951-56 when it was 7.2% per annum as compared with a National trend of 5.9%.
- 4.17. Comparison between the growth trends of the Central Area, Inner Ring, City boundary and the National average is illustrated on Figure 2.

5. ANALYSIS OF 1956 ORIGIN AND DESTINATION SURVEY

5.01. The most comprehensive survey of the origins and destinations of traffic movements into and within the City of Cambridge is that carried out in 1956. An inner cordon of points intercepted movements into the Central Area (Zone Z) covering the main commercial and shopping district as shown on Figure 3. It was possible, however, to enter the Lion Yard Car Park from St. Andrew's Hill without crossing the cordon of points enclosing Zone Z. The movements to Zone Z therefore do not include all movements to the Lion Yard Car Park. An outer cordon of census points on the radial roads intercepted vehicles from the outer areas.

A series of intermediate points divided the area between the two cordons into three "Urban" Zones W, X and Y. By examining the radial roads intercepted by the cordon of outer points, in relation to the overall road pattern, it was possible to identify 10 Outer Zones or radial sectors (A-K) of unknown extent, as shown on Figure 4.

5.02. The outer cordon enclosing Zones W, X, Y and Z (for convenience referred to in this Report as the 'Census Area') contained only 49% of the population of Cambridge and only 35% of the built-up area within the Cambridge Green Belt. Large areas of "suburban" Cambridge within the City boundary were excluded from the Census Area particularly in the south east.

5.03. The 1948 Origin and Destination Survey was taken on the City boundary and gave a better picture of the traffic entering Cambridge from areas wholly outside the City boundary. It must be questioned, however, whether after 14 years the results of this survey, taken in the time of petrol rationing, are representative of similar movements today.

5.04. The 1951 Origin and Destination Survey of the Central Area was superseded by the 1956 Survey. The 1960 Survey was of limited duration and was designed to assist in the routing of traffic movements. The 1956 Survey was, therefore, considered to be the most suitable for determining the pattern of traffic movements within Cambridge.

5.05. The 1956 Origin and Destination Survey intercepted in the period 2 p.m. - 6 p.m. a total of 25,329 trips summarised as follows:

Total Trips Intercepted	
Outer Zone/Outer Zone	2,345 (9%)
Outer Zone/Urban Zone (W, X or Y)	13,231 (52%)
Urban Zone/Urban Zone	<u>3,379 (13%)</u>
Total trips not associated with Central Zone (Z)	18,955 (74%)
Outer Zone/Central Zone (Z)	2,135 (9%)
Urban Zone/Central Zone (Z)	<u>4,239 (17%)</u>
Total trips associated with Central Zone (Z)	6,374 (26%)
Total all trips	25,329 (100%)

5.06. The analysis and tabulations carried out by the Planning Department were directed towards evaluating the Development Plan road proposals. To examine the alternative plans put forward by the University, it was necessary to retabulate the results of the Survey in a more flexible form.

5.07. A full analysis of stopping and non-stopping traffic has been carried out and the results are summarised to give an N X N table of movements (Table 3). Where possible the different routes taken by each movement have been identified and are set out in Tables 4, 5, 6 and 7. Movements whose routes have not been identified are not tabulated and have been assumed to take the most direct route.

5.08. The figures in Tables 3 to 7 are two way traffic volumes measured in vehicles over a four hour period (2 p.m. - 6 p.m.) on Friday 26th May, 1956. Journeys which stopped in the Census Area have been split and the trips between stops considered as separate journeys. Loop journeys whose origin and destination were the same or similar were assumed to have stopped and have been divided at the City centre or the furthest point reached and considered as two journeys.

5.09. River crossing journeys whose routes are tabulated in Tables 4 and 5 exclude journeys to the centre (fully detailed in Table 7) and journeys which cross the river twice.

5.10. The N X N table of movements is also shown graphically as traffic desire lines in Figure 5. The lines or bands show the volume of traffic travelling between any particular Zones or points on the outer cordon. The widths of the lines indicate to scale the volume of traffic in vehicles in the period 2 p.m. - 6 p.m. The lines are drawn irrespective of any routes which the traffic uses and the purpose of the diagram is to show quantitatively the direction of traffic movements.

6. ANALYSIS OF JOURNEY TIME SURVEYS

6.01. Measurements of journey times and traffic speeds can be usefully applied to traffic analysis in two ways. Firstly, time taken can give some indication of driving conditions and repeated measurements over a period can indicate improvement or deterioration of those conditions. Secondly, a comparison of journey times over a network of roads can determine the pattern of choice of alternative routes. This information can be used to estimate the attraction of a new road facility based on time saved.

6.02. The Journey Time Surveys carried out prior to 1962 were of limited extent and consisted, in the main, of repeated measurements of the journey time from Huntingdon Road (Storeys Way) to Hills Road (Brooklands Avenue). Although most of the total times for the route were recorded to the nearest second, times for the road links between major intersections on the route were recorded to only the nearest minute. The 1956 survey, although more extensive, was carried out to determine a standard for the classification of stopping traffic in the Origin and Destination Survey. Journey times between intersections were again recorded to only the nearest minute.

6.03. The data available were thus more suitable for comparative measurements of driving conditions through the City centre in the North-South direction. The following average speeds were recorded:

Date	Av. Speed m.p.h.
1956 May	14.5
1958 August	12.7
1959 February	13.9
1960 October	12.8
1960 December	12.5
1961 August	11.9
1961 November	12.8

6.04. Although these results show considerable seasonal variation, there is evidence that the average speed through the centre has decreased by about 2 m.p.h. in the period 1956-61.

6.05. In order to obtain more reliable journey time information for the assignment of traffic, a comprehensive Journey Time Survey was carried out in the early part of 1962 covering the links between all main intersections on all traffic routes affected by the Plan. The results of the survey are summarised in Table 8. The "floating" car method was used, by which the survey vehicles are driven as near as possible at the same speed as the general flow of traffic and the number of overtaken cars is made equal to the number overtaking. All times were recorded to the nearest second at the mid point of each junction and an equal number of runs were made in each direction. The "Average Delay Time" noted in Table 8 is the average of all delays lasting more than 10 seconds during which the survey vehicle was stationary. The "Average Journey Time" and the "Average Speed" in the table includes for all such delays.

6.06. The distribution of traffic speeds on the road and street network is shown graphically on Figure 6.

6.07. The average speeds in 1962 on the roads covered by the traffic growth analysis in Section 3 above has been estimated as follows:

Area	Length - Miles	Speed m.p.h.
Central Area	2.95	13.5
Inner Ring	3.47	18.9

7. ANALYSIS OF PARKING SURVEYS

Types of Survey

7.01. Two types of survey have been carried out:

- (a) Surveys of Parking Accumulation.
- (b) Surveys of Parking Duration.

7.02. A Parking Accumulation Survey consists of a count of the number of vehicles parked in an area at any one time. Counts of the peak accumulation in a day give a measure of the demand for parking spaces if there is still free capacity and repeated counts of peak accumulations can give an indication of the growth of demand up to the point at which saturation is reached.

7.03. A Parking Duration Survey consists of repeated observations of vehicles parked in an area throughout a period of time. The results of the survey provide information on the pattern of parking with respect to time and place, i.e. usage. The value of the survey depends on the frequency of the repeated observations. The shorter the interval between observations the more short term parkers will be counted and the greater will be the accuracy of the duration classification.

Comparison of Repeated Surveys

7.04. A total of twelve surveys of both types have been carried out by various authorities in Cambridge. Great care must be taken in comparing the results of repeated surveys to ensure that they cover the same area and in the case of Duration Surveys that they also cover the same period of time and had the same frequency of observation.

7.05. Areas 1, 2 and 3 referred to in paragraph 3.06 are those areas shown on Figure 7. These areas were revised in 1962 such that Areas 1 and 2 cover the proposed meter controlled zone under consideration by the City Council. The areas are not the same as the Areas 1, 2 and 3 referred to in the County Planning Department 1957 Traffic Report. All comparisons made in this Report have been on the basis of the new areas.

7.06. Care must also be taken in comparing the surveys made by different authorities to ensure that the surveys cover the same vehicle classifications. Some surveys included motor cycles and some did not. Some surveys included all motor cycles wherever they were parked and others included only motor cycles occupying a space which could have been used by a car. Where possible motor cycles have been excluded when comparing results of Accumulation Surveys.

Accumulation Surveys

7.07. The results of the Parking Accumulation Surveys (excluding motor cycles) have been summarised in Tables 9, 10 and 11. The surveys carried out by the County Planning Department and Messrs. Atkins are directly comparable. The surveys carried out by the Police did not cover all the streets in the survey area. Where only minor side streets were omitted, the results are comparable.

7.08. The past growth trends of mid-afternoon peak accumulations are summarised in Table 12.

7.09. The results show that since July 1956 Area 1 has been saturated on a Friday and Saturday and has a maximum capacity of about 800 (510 in the streets and 290 in the car parks). Even so each year one or two more parkers still managed to squeeze themselves in. In 1962 there were still about 100 spare spaces with respect to this maximum capacity on Thursdays.

7.10. In 1962 combined Area 1 and 2 approached saturation capacity on Fridays of about 1230 on the streets and 550 in the car parks (total 1880) although this level of parking was observed in October 1961 on a Saturday. There were still about 300 spaces spare on Thursday.

7.11. There was as yet no indication that similar saturation capacity had been reached in combined Area 1, 2 and 3. The growth of peak accumulation in this survey area has been at an average rate of 8.5% per annum in the period 1956-61. This is similar to the growth rate of traffic movement and vehicle registrations in the same period.

7.12. The overall pattern of growth is one of uninhibited demand giving rise to peak hour saturation over an expanding area and an expansion, in the central areas, of the period during the day when saturation conditions exist.

Duration Surveys

7.13. The results of the 1956 and 1959 Duration Surveys have been re-tabulated on a street basis in accordance with the revised survey areas (Tables 13 - 18). The results of the 1959 Survey have been further summarised in Table 19 to show for each duration classification the relationship of the total volume parked during the day (8 a.m. - 6 p.m.) to the peak accumulation parked at 12 noon.

7.14. The tabulations 13 - 15 give details of the total number (volume) of vehicles which arrive and park in each street in the period 8 a.m. to 6 p.m. The total parking volumes are subdivided into the following duration of stay and time of arrival classifications.

Duration Classifications	Less than 1 hour
	1 - 2 hours
	2 - 4 hours
	4 - 6 hours
	Longer than 6 hours
Time of Arrival Classifications	8 a.m. - 10 a.m.
	10 a.m. - 12 noon
	12 noon - 2 p.m.
	2 p.m. - 4 p.m.
	4 p.m. - 6 p.m.

7.15. The surveys were based on repeated observations of parked vehicles at 15 minute intervals in the central areas and 30 minute intervals in the outer areas. The duration classification was based on the following:

No. of Observations		Duration Classification
Observations at 15 minute intervals	Observations at 30 minute intervals	
1 - 4	1 - 2	Less than 1 hour
5 - 8	3 - 4	1 - 2 hours
9 - 16	5 - 8	2 - 4 hours
17 - 24	9 - 12	4 - 6 hours
More than 24	More than 12	Longer than 6 hours

7.16. Hourly accumulations are also tabulated (Tables 16, 17 and 18). These accumulations are for a composite weekday and are not directly comparable with peak accumulation counts. The composite weekday accumulations are plotted graphically on Figures 8, 9, 10 and 11.

7.17. The Duration Survey carried out by the City Police in 1961 covered only the main streets of Areas 1 and 2 and was based on repeated observations at 30 minute intervals over a period of 9 a.m. to 6 p.m., one hour less than the County Planning Department survey period. A great number of short term parkers have been missed and care must be taken in comparing the results of this Survey.

Comparison between Parking and O & D Surveys

7.18. In May 1956 (in term), the O & D Survey intercepted a total of 6374 trips whose origin or destination (two-way movement) were in Zone Z in the period 2 p.m. - 6 p.m. on a Friday.

7.19. In July 1956 (out of term), the parking duration survey identified a total of 1831 arrivals in the same period on an average weekday within an area equivalent to Zone Z but including all arrivals to the Lion Yard Car Park. From a consideration of arrivals earlier in the day and observed parking durations it is estimated that approximately 2206 departures took place in the same period giving a total two-way movement of 4037 trips, i.e. about 63% of the movement identified by the O & D Survey.

7.20. The reasons for this difference are as follows:

- (a) The O & D Survey identified all trips which stopped for 3 minutes or longer whereas the parking survey based on repeated observations at 15 minute intervals must have failed to record many of the very short-term parkers.
- (b) The O & D Survey results include certain loop journeys which virtually did not stop at all.
- (c) The O & D Survey includes all trips generated by private and residential parking not covered by the Parking Duration Survey.

8. SUMMARY OF PAST GROWTH PATTERNS

8.01. The comparison between the growth of traffic and parking in Cambridge and the growth of population and vehicle registrations is set out in Table 20 and shown graphically on Figure 12. Also shown for comparison are the national growth trends.

8.02. Cambridgeshire already has a high ratio of vehicles per head of population - 0.259 in 1960 compared with the national average of 0.185. The County is thus nearer saturation level and this probably accounts for the fact that vehicle ownership is increasing at a slightly lesser rate per annum than the national average.

8.03. The average increase in traffic and parking in Cambridge in the period 1956-60 has been about 30% or 6.8% per annum compound.

PART III - EXISTING TRAFFIC AND PARKING PATTERNS

9. TRAFFIC PATTERN

Average Hour Volumes

9.01. The pattern of the average hour volumes of traffic flows on each main road in the City, as derived from the 1960 volumetric counts, is shown on Figure 13. The width of the band represents to scale the average volume of traffic in the period 8.30 a.m. - 6 p.m. in vehicles per hour.

The increase in traffic since 1956 is shown diagrammatically within this width. The traffic flows on sections of road between census points have been interpolated or estimated and the widths of the band should not be assumed to be precise.

Peak Hour Volumes

9.02. Average and peak hour flows on the main streets in the City in May 1960 are compared in Table 21.

9.03. The relationship of the traffic flow in each hour to the average hourly flow (8.30 a.m. - 6 p.m.) on the main streets of the Central Area and Inner Ring is shown on Figure 14 for the years 1951 and 1960.

The hourly variations were derived from counts in 1951 and 1960 on the following streets:

<u>Central Area</u>	<u>Inner Ring</u>
Magdalene Street	Queens Road
Market Street	Lensfield Road
St. Andrew's Street	Victoria Avenue
Emmanuel Street	Parkside
Downing Street	

The relative volume of the morning peak period is shown over half an hour only and may be higher than the average over the full hour 8 a.m. - 9 a.m.

9.04. The ratio of peak hour flow (5 p.m. - 6 p.m.) to average hourly flow in the period 8.30 a.m. to 6 p.m. has been increasing since 1948. Comparisons have been made between 5 - 6 p.m. peak hour and average hour traffic measured in vehicle miles on the streets in the Central Area and on the Inner Ring for the five survey dates in the period 1948-1960. The results are summarised in the following table:

Ratio 5-6 p.m. Peak hour vehicle-miles

Average hour vehicle-miles

<u>Year</u>	<u>Central Area</u>	<u>Inner Ring</u>
1948	0.98	1.18
1951	1.10	1.35
1956	1.09	1.19
1958	1.18	1.27
1960	1.25	1.38

Daily Variation

9.05. The comparison of traffic volumes on Thursday (early closing day), Friday and Saturday in May 1960 on three Central Area streets is shown diagrammatically on Figure 15. The relative variation of the Thursday and Saturday morning (8.30 a.m. - 1 p.m.) and afternoon (1 p.m. - 6 p.m.) flows with respect to the Friday morning and afternoon flows on each street is as follows:

Street	Period	Thursday	Friday	Saturday
Kings Parade	Morning	104	100	129
	Afternoon	84	100	99
Trinity Street	Morning	102	100	122
	Afternoon	85	100	87
St. Andrew's Street	Morning	99	100	114
	Afternoon	90	100	104

Pattern of Movements between Zones

9.06. The pattern of traffic movements was related to the following areas or Zones which are shown on Figure 4.

- (i) Zone Z - Central Zone of 1956 O & D Survey.
- (ii) Three Zones W, X and Y - Urban Zones between the inner and outer cordons of the 1956 O & D Survey.
- (iii) Eight Zones, A1 and D1-K1 - Suburban Zones outside the outer cordon of the 1956 survey but inside the City boundary served by the main radial roads corresponding to the Rural Zones below.

(iv) Ten Zones A2 - K2. These are Rural Zones of indefinite extent representing the hinterland of Cambridge served by the 10 main radial roads which were intercepted by the 1956 O & D Survey outer cordon of points.

Zones W, X and Y and Z comprise the 'Census Area' of the 1956 O & D Survey. The Suburban and Rural Zones together form the 'Outer Zones' referred to in paragraph 5.01.

Rural and Suburban Movements to Census Area.

9.07. The distribution of Rural and Suburban movements entering the Census Area is as follows:

Movement	Trips 2 p.m. - 6 p.m. intercepted 1956 O & D Survey	%
'Through' movements from one Rural or Suburban Zone to another. This traffic does not stop in the Census Area and is potential traffic for the outer by-passes	2345	23
Stopping trips in Urban Zones W, X and Y Stopping trips in Central Zone Z Total trips stopping in Census Area	6615 <u>1068</u> 7683	77
Total	10,028	100

9.08. The pattern of through movements (23% of the traffic entering the Census Area) is shown on Figure 16 and confirms that a very small number of these movements enter the congested Central Area.

9.09. The distribution of trips from the Outer Zones stopping in the Census Area and the relationship of the distribution to the relative areas of the Urban and Central Zones is as follows:

Zone	Area %	Distribution Stopping Trips %	'Intensity' of Stopping Trips/Area
Urban Zone W	28	24	0.85
X	32	7	0.22
Y	34	55	1.62
Central Zone Z	6	14	2.33
Total	100	100	1.00

9.10. The distribution by Rural and Suburban Zones of the trips stopping in the Central and Urban Zones is as follows:

Direction of Approach	Entry Point	Rural Zone %	Suburban Zone %	Total %
North and West	Chesterton Road	H -)	H1 6)	6)
	Milton Road	J 7)	J1 3)	10)
	Histon Road	K 4)	K1 -)	4)
	Huntingdon Road	A 10) 30	A1 1) 10	11) 40
	Madingley Road	B 5)	B1 -)	5)
	Barton Road	C 4)	C1 -)	4)
South and East	Trumpington Road	D 15)	D1 2)	17)
	Hills Road	E 8.5) 33.5	E1 8.5) 26.5	17) 60
	Mill Road	F -)	F1 8)	8)
	Newmarket Road	G 10)	G1 8)	18)
	Total	63.5	36.5	100

The distribution of the movements intercepted at the outer cordon of points between Rural and Suburban Zones has been estimated from a comparison of O & D census cordon and City boundary counts, assuming that most of the through traffic was generated by the Rural Zones.

9.11. The pattern of stopping trips to the Census Area is shown diagrammatically on Figure 17.

Movements to Central Zone Z

9.12. The 1956 O & D Survey intercepted a total of 4613 trips entering Central Zone Z in the period 2 p.m. - 6 p.m. These trips are analysed in the following table:

Outer point/outer point - 'through traffic'	204 (4%)
Outer point/Urban Zone	736 (16%)
Urban Zone/Urban Zone	485 (11%)
Total 'local through' traffic	1,221 (27%)
Total 'local through' and 'through' traffic	1,425 (31%)
Outer point/ Central Zone	1,068 (23%)
Urban Zone / Central Zone	2,120 (46%)
Total central traffic	3,188 (69%)
Total entering Central Area	4,613(100%)

9.13. The sum of the Rural-Rural, Urban-Urban and Rural-Urban movements which pass through the Centre without stopping is 31% of the total movements entering the Centre. Such Rural-Urban and Urban-Urban traffic is 'Local through' traffic which has business in Cambridge but not in the Centre and would be attracted to an inner by-pass with consequent relief to the Centre.

The pattern of the non-stopping movements within Zone Z is shown on Figure 18. More than one half (53%) of the total traffic on Magdalene Bridge is traffic which does not stop in Central Zone Z.

9.14. Only 4% of the traffic in the Central Area consists of non-stop 'through' movements from one Rural or Suburban zone to another. Even if all these trips were attracted to outer by-passes the relief to the Central Area congestion would be negligible.

9.15. The distribution by points of entry and exit of the stopping trips to Zone Z which comprise 69% of the total trips to and from Zone Z is as follows:

Point	%
Magdalene Bridge	19.8
Trumpington St.	27.9
*Corn Exchange St.	2.2
St. Andrew's St.	24.7
*King Street 9.6%)	25.4
Jesus Lane 15.8%)	
Total	100

* exit only

Direction	From	To	%
South East- North West	Trumpington Road Hills Road and Mill Road	Huntingdon Road Histon Road and Zone W	10
South - North East	Trumpington Road and Hills Road	Chesterton Road and Milton Road	3
South-North	Newmarket Road and Mill Road	Chesterton Road and Milton Road	3
East - West	Newmarket Road Mill Road, Hills Road	Madingley Road Barton Road Zone X	16
	Trumpington Road Newmarket Road	Huntingdon Road Histon Road and Zone W	
Stopping movements to Zones Y and Z			68
Total			100

9.23. The distribution by river crossing point of movements in each of the above directions is as follows:

River Crossing	Direction				Stopping Y and Z
	SE/NW	S/NE	S/N	E/W	
Fen Causeway	49	48	-	35	16
Silver Street	4	2	-	4	15
Magdalene Bridge	22	16	2	8	29
Victoria Avenue	25	34	98	53	40
Total	100%	100%	100%	100%	100%

9.24. The distribution by direction of the movements on each river crossing is as follows:

Direction	Fen Causeway	Silver St.	Magdalene Br.	Victoria Av.
SE/NW	20	3	9	6
S/NE	7	1	2	2
S/N	-	-	-	6
E/W	25	5	6	21
Stopping in Y & Z	48	91	83	65
	100%	100%	100%	100%

These distributions show that Silver Street and Magdalene Bridge are mainly used as entry points to Zones Y and Z. Victoria Avenue is also heavily used by this type of traffic but in addition forms an important link for East-West movements. The South-East-North West and South-North East movements form only 10% of the river crossing traffic. Half of these movements use Fen Causeway and Silver Street, i.e. the Backs. The North-South movement is negligible and is almost entirely carried by Victoria Avenue (see Figure 19).

Queens Road

9.25. The composition of traffic flow on Queens Road (the Backs) in 1956 was as follows:

(1) Through traffic - outer point to outer point	33%
(2) Local through traffic associated with a stop in Zones W, Y or Z	47%
(3) Stopping traffic in Zone X	20%
Total	<u>100%</u>

It should be noted that the traffic flow on Queens Road shown in Figure 16 illustrates only the through traffic (1) above which comprises only 33% of the total traffic on Queens Road.

Summary of Existing Pattern of Traffic Movements

9.26. There is no evidence in the subsequent volumetric counts or other survey data that the results of the 1956 O & D Survey do not represent the pattern of traffic movements in Cambridge today.

9.27. The above tabulations and diagrams have shown that:

- (a) 69% of all trips entering the Census Area stopped in Zone Y or Zone Z.
- (b) 68% of all river crossings are associated with an origin or destination in Zone Y or Zone Z.
- (c) The "spine" route through Zone Z is an attractive route for local through traffic even with present congested conditions.

9.28. Zones Y and Z are thus major traffic generating areas and a very important part of the traffic plan must be to provide a road system capable of distributing trips terminating in these zones. Moreover a new river crossing which is not

attractive to trips terminating in Zone Y or Z is unlikely to provide much relief to existing congestion at the bridges.

9.29. The tabulations also show that in the most congested part of the centre, as represented by Zone Z, no relief can be expected by the provision of outer by-passes. The non-stopping traffic through this Zone is mainly local traffic trying to reach a destination in Zone Y. The problem is one of providing a new facility or facilities which will distribute these movements and act as an inner by-pass to the Central Area.

9.30. The "Spine" is the most direct route in the north-south direction through the Town. It is probable that any traffic, at present using this route through the centre for a non-stop journey, which may be attracted by some new facility to be provided, would be almost immediately replaced either by traffic which is at present deterred by the congestion or by an increase in the present pattern of movements whose "free" growth has been inhibited by the congested conditions. The future traffic plan must, therefore, include positive steps to prevent through movements in the north-south direction from passing through the Central Area.

10. PARKING PATTERN

Distribution of vehicles parked

10.01. The distribution of the mid-afternoon peak accumulation of parking on a Thursday, Friday and Saturday in October 1961 is shown on Figures 20, 21 and 22. On these diagrams the dots have been plotted diagrammatically and do not show precise positions of vehicles. Correct numbers of dots are, however, shown within the boxes indicating the authorised street parking areas.

10.02. The changing distribution of vehicles parked at the mid-afternoon peak accumulation on a Friday at various survey dates since 1956 is shown in the following table:

	July 1956 (%)	July 1959 (%)	Oct. 1961 (%)	Feb. 1962 (%)	April 1962 (%)
Area 1	725 (50.5)	766 (41.3)	758 (34.8)	817 (37.8)	816 (38.3)
Area 2	550 (38.4)	723 (39.0)	826 (38.0)	855 (39.7)	796 (37.4)
Area 3	158 (11.1)	367 (19.7)	591 (27.2)	486 (22.5)	517 (24.3)
Total	1433 (100)	1856 (100)	2175 (100)	2158 (100)	2129 (100)

10.03. This shows that during the period considered (1956-62) Area 1 has been virtually saturated at peak periods, and that combined Area 1 and 2 became saturated some time between 1959 and 1961. Up to October 1961 it appears that increasing demand for parking space was catered for by the growth of parking in Area 3.

10.04. The average of the combined results of the last three Parking Accumulation Surveys which were carried out within a six month period, October 1961 - April 1962, has been used to obtain the following estimated distribution of parked vehicles at a mid-afternoon peak on a Friday.

	<u>Area</u>	<u>Vehicles</u>	<u>%</u>
Parking in streets and public car parks	Area 1	797	(23.0)
	Area 2	826	(23.9)
	Area 3	531	(15.3)
	Fringe Area	142	(4.1)
	Fitzroy St. shopping area	330	(9.5)
<hr/>			
Total public car parking		2626	(75.8)
Private parking areas (in Areas 1,2 and 3 only)		836	(24.2)
<hr/>			
Total		3462	(100)
<hr/>			

The distribution of private parking is set out in Table 22. The Fringe Area includes Victoria Avenue and areas south of Gonville Place and Lensfield Road and west of Queens Road which are believed to be used occasionally for parking related to the Central Area.

Authorised Parking

10.05. The distribution of authorised and non-authorised parking at the mid-afternoon peak in October 1961 is shown in Table 23. Of a total of 1504 vehicles parked on the streets on a Friday afternoon in Areas 1, 2 and 3 combined only 347 vehicles (23%) could find an authorised space in which to park. A considerable number were parked illegally under no waiting signs on the main traffic routes and the balance were parked in the side streets giving offence to local inhabitants and sometimes causing obstruction.

Volume and Usage

10.06. The City Council's proposed meter controlled parking area covers Areas 1 and 2 of the parking survey and the pattern of parking within this area has been examined in some detail.

10.07. The distribution of parkers by duration in Areas 1 and 2 combined is as follows:

<u>Duration</u>	<u>1956</u>	<u>1959</u>
Less than 1 hour	5249 (70)	5964 (71)
1 - 2 hours	1020 (14)	1057 (13)
2 - 4 hours	714 (10)	800 (9)
4 - 6 hours	227 (3)	276 (3)
More than 6 hours	249 (3)	335 (4)
Total volume	7459 (100%)	8432 (100%)

10.08. From an examination of the field sheets of the two surveys, the following average lengths of stay for each duration classification have been estimated.

<u>Duration Classification</u>	<u>Average length of stay</u>
Less than 1 hour	20 minutes
1 - 2 hours	1½ hours
2 - 4 hours	3 hours
4 - 6 hours	5 hours
More than 6 hours	7½ hours

10.09. The "Usage" of the space available, by the parkers within each duration classification, has been estimated on the basis of the above lengths of stay. "Usage" is defined as the product of space and time.

<u>Duration</u>	<u>Usage - Space Hours</u>	
	<u>1956</u>	<u>1959</u>
Less than 1 hour	1749 (21)	1988 (20)
1 - 2 hours	1530 (18)	1585 (16)
2 - 4 hours	2142 (25)	2400 (24)
4 - 6 hours	1135 (14)	1380 (14)
More than 6 hours	1870 (22)	2515 (26)
Total Usage	8426 (100%)	9868 (100%)

10.10. The distribution patterns of Volume and Usage in 1956 and 1959 are very similar. This confirms that saturation conditions at time of peak accumulation had not been reached in combined Area 1 and 2 by 1959. The pattern as represented by the 1956 and 1959 surveys is therefore representative of the pattern of free demand for parking in these areas.

10.11. If parkers within the duration classifications of less than 1 hour and 1 to 2 hours are regarded as Short Term parkers and the remainder as Long Term parkers, the parking pattern can be summarised as follows:

	<u>Volume</u>	<u>Space Used</u>	<u>Av. Length of stay</u>
Short Term	84%	37%	31 mins.
Long Term	16%	63%	4 hrs. 24 mins.
All Parkers	100%	100%	1 hr. 9 mins.

The full relationship of Volume to Usage has been shown graphically on Figure 23. The distribution of Volume and Usage on an area basis is summarised on Figure 24.

Occupancy

10.12. The "Occupancy" of a parking facility or facilities is defined as the ratio of the space used or occupied to the total space available in a given period of time. The space used and the space available are both measured as the products of space (occupied or available) and time (of occupation or availability) in units of space-hours. The Occupancy of the facilities in combined Areas 1 and 2 for 1956 and 1959 has been calculated as follows:

Facility	1956			1959		
	Space Used	Space Available	Occupancy	Space Used	Space Available	Occupancy
Streets	5464	8880	61.6%	6275	9750	64.4%
Car Parks	2965	3870	76.6%	3591	5140	69.9%
Total	8429	12,750	66.1%	9866	14,890	66.2%

Turnover

10.13. Parking "Turnover" is defined as the number of times a parking space is used in a given period of time. The following overall turnover in 10 hours (8 a.m. - 6 p.m.) of parking spaces in Areas 1 and 2 has been determined on the basis of a capacity equal to a Friday mid-afternoon peak accumulation.

	1956			1959		
	Volume	Spaces	Turnover	Volume	Spaces	Turnover
Streets	6338	888	7.2	7014	975	7.2
Car Parks	1121	387	2.9	1418	514	2.8
Total	7459	1275	5.8	8432	1489	5.7

Daily Variation

10.14. The variation between Thursday, Friday and Saturday peak accumulations has been summarised in Table 24. Under free demand conditions before saturation is reached the following daily variations compared with Friday have been observed for Areas 1, 2 and 3 combined:

<u>Day</u>	<u>Friday Peak Accumulation</u>
Thursday	72 - 83%
Friday	100%
Saturday	107 - 130%

The variation between Thursday and Friday is generally more regular than the variation between Friday and Saturday.

In Term and Out of Term Variation

10.15. The October 1961 and February 1962 peak accumulation counts were carried out in the University term. All other accumulation counts have been carried out in the vacation periods.

10.16. The variations between in term and out of term counts are as follows:

	Area 1			Area 1 & 2			Area 1 & 2 & 3		
	Thurs.	Fri.	Sat.	Thurs.	Fri.	Sat.	Thurs.	Fri.	Sat.
In term	100	100	100	100	100	100	100	100	100
Out of term	84	100	100	85	96	104	85	99	108

10.17. These variations have been obtained from a comparison of Messrs. W.S. Atkins' February and April peak accumulation surveys carried out in 1962.

10.18. There is little significant variation on a Friday between in term and out of term counts. This may be because saturation conditions are now reached on a Friday. On Saturday the effect of the University is masked by fluctuations due to the incidence of sporting and other events. The variation on a Thursday is more clearly marked and the peak accumulation on a Thursday is about 15% less in Out of Term than In Term periods.

Parking Purpose

10.19. Although there is no precise information available, certain indication of the purpose of parking in Cambridge can be obtained from the results of the surveys carried out.

10.20. The Thursday peak accumulations were measured in the afternoon when all shops were closed. The following reductions in peak accumulation compared with the In Term Friday accumulation in Areas 1 and 2 have been observed.

Friday in term	100%
Thursday in term	78%
Thursday out of term	67%

10.21. On this basis it can be estimated that the distribution by purpose of parkers at peak periods on a weekday is as follows:

	<u>In term</u>	<u>Out of term</u>
University	11%	-
Shopping	22%	25%
All Other	67%	75%
Total	100%	100%

10.22. Studies in America have shown that in towns of 100,000 population the average parking duration of shoppers is about 1 hour. No similar data are available in the United Kingdom. If it is assumed that people who have come to Cambridge by car in order to shop are generally short term parkers who park for an average duration of one hour, and that they occupy 25% (out of term) of the total space, the parking analysis (Figure 23) shows that such parkers would comprise about 40% of the volume parking on the streets and public car parks. The proportions would be slightly less in term time.

10.23. If parking on the streets and in the public car parks comprises 63% (see paragraph 7.19) of the trips to the centre, then the above figures indicate that 25% (63% of 40%) of the trips to the Central Area are shoppers.

10.24. In April 1962, the Department of Applied Economics, University of Cambridge, sent out questionnaires by post with the object of determining the relationship between price and demand for parking in Areas 1 and 2. The questionnaire was sent to a sample of the owners of cars registered in the County and included a question asking what was the main purpose of the owner's last visit to Cambridge when his car was parked in a public place in the proposed Meter Zone. Preliminary results indicate that between 23% and 34% of the demand for parking space is for shopping.

10.25. American experience has shown that for cities of population 100,000 25-30% of the stopping trips to the Central Business District are shoppers. The above figures indicate that the proportion of stopping trips to Cambridge is not significantly different.

10.26. The pattern of existing traffic shows that stopping trips make up 69% of the traffic entering the Central Area (see paragraph 9.12). If it is assumed, as would seem reasonable, that the proportion of stopping trips to Cambridge associated with shopping is not significantly greater than 25%, then, if all the shoppers could be removed from the centre the maximum relief to traffic on the Central Area streets would be 17% (25% of 69%).

10.27. The observed reduction of traffic flow on certain streets on a Thursday afternoon compared with traffic on a Friday afternoon was about 15% (see paragraph 9.05). This reduction is slightly less than might be expected from the above assumptions of the proportion of shopping traffic. This may be because the relief of congestion in the centre on Thursday afternoon attracts more non stopping traffic to the Central Area streets.

10.28. On either basis it is clear that shopping trips comprise only a relatively small proportion of the total traffic in the centre.

10.29. The ratio of Saturday to Friday peak parking accumulations varies considerably. The demand on Saturday is not so steady as on other weekdays, and Saturday parking would seem to be influenced by certain factors which do not affect the mid-week pattern. Although it is recognised that the number of work and business trips are less and that there are more shopping trips on a Saturday, the fluctuations shown in paragraph 10.14 indicate that some of the trips to the Central Area on a Saturday are tourists and for recreation (in particular outside sporting activities). These trips are influenced by the weather and the programme of attractions in Cambridge which would not affect midweek parking.

Summary of Parking Pattern

10.30. Uncontrolled parking in Cambridge at present restricts traffic movement on the streets, gives rise to delays which cause big variations in journey time and generally creates an environment which is not in keeping with the traditional centre of Cambridge.

10.31. 63% of the parking space is used by only 16% of the parkers. It is therefore essential that one aspect of the solution to the parking problem should be to make better use of the space available.

PART IV - FUTURE TRAFFIC MOVEMENTS

11. GROWTH OF TRAFFIC MOVEMENTS

Design Year

11.01. The life of a new road in an urban area should be at least as long as any new building erected beside it. This is considered to be 50-60 years and it is therefore unrealistic to limit the planning of roads to the 10 year statutory planning period of the Development Plan.

11.02. Within the next 50-60 years vehicle ownership per head of population in Great Britain is expected to reach a saturation value. Estimates of future traffic growth have been based on this saturation condition regardless of the year when it may occur.

11.03. The fullest information on traffic movements and parking is available for 1956. The year 1956 has therefore been considered as the 'base' for future traffic growth estimations.

Growth of Vehicle Ownership

11.04. The change in population and number of vehicles registered in Cambridgeshire and the whole of Great Britain for the period 1951-61 is shown in Table 25. In 1956 the number of vehicles per head of population was as follows:

	<u>Cambridgeshire</u>	<u>Great Britain</u>
All vehicles	0.208	0.139
Cars	0.111	0.078

11.05. The Road Research Laboratory (Road Research 1960) have estimated that ownership saturation will be reached at a level of 0.6 vehicles of all types per head (0.37 cars per head). It is understood that this saturation level is under review and may in fact be a little lower. The above value, however, has been taken in considering growth figures.

11.06. On this basis the following growth figures due to increase in vehicle ownership from 1956 have been determined.

	<u>Cambridgeshire</u>	<u>Great Britain</u>
All vehicles	2.88	4.32
Cars	3.33	4.75
Factor adopted for growth estimation in Cambridge	2.9	4.3

Population Growth

11.07. The pattern of past growth showed that traffic growth was closely related to growth of vehicles registered.

11.08. The ultimate number of vehicles registered in Cambridgeshire will depend on the growth of vehicle ownership as estimated above and the growth of population.

11.09. The policy of the Development Plan is to limit the growth of the population of the City of Cambridge and to allow a greater expansion in the surrounding villages. This redistribution of population will cause a change in the traffic pattern and higher traffic growth will be associated with the areas of greater population increase.

11.10. The population growth factors in the Zones listed in paragraph 9.06 above, which were used for the analysis of the existing traffic pattern, are estimated as follows:

Growth Factors - 1956 to 'Ultimate'										
Rural Zones	A2 1.40	B2 1.13	C2 1.55	D2 1.55	E2 1.59	F2 -	G2 1.21	H2 -	J2 1.17	K2 1.73
Suburban Zones	A1 1.27	B1 -	C1 -	D1 1.12	E1 1.15	F1 0.88	G1 1.05	H1 1.02	J1 1.96	K1 -
Central and Urban Zones (1956 O & D Census Area)	W, X, Y and Z combined 0.97									

The growth figures for the Rural Zones refer to an area within about 10 miles of Cambridge which, regardless of any other changes in the present hinterland, is likely to remain directly dependent on Cambridge.

Growth of Suburban and Rural Movements to Cambridge

11.11. For estimates of future growth, the movements terminating in the Urban and Central Zones of Cambridge (the 1956 O & D Survey Census Area) have been combined for each entry point.

11.12. For each entry point a future growth factor for suburban and rural movements to the Census Area has been calculated from the following equation:

$$G = 2.9 (P_S \times S + P_R \times R)$$

Where 2.9 is the growth due to increase in vehicle ownership in Cambridgeshire:

- P_S is the growth of population of suburban zone
 S is the proportion of the total movement associated with the suburban area
 P_R is the growth of population of the rural zone
 R is the proportion of the total movement associated with the rural area.

11.13. This method of calculating growth does not assume that all the trips from the rural area terminating in the Census Area necessarily originate from an area within 10 miles of the City. It is considered that growth of traffic generating forces of this rural area is representative of the growth of the traffic generating forces within the whole hinterland of Cambridge.

The assumed growth can be due to either an increase in the population of the present hinterland or an increase in the area of the hinterland dependent on Cambridge, or, as is more likely, to a combination of both these factors.

11.14. The growth of rural movements to Cambridge from outside the county will be less affected by growth of population and more affected by the national vehicle ownership growth factor (4.3) which is considerably higher than that taken for Cambridge (2.9). The average of the growth factors calculated for stopping trips to Cambridge from outside the Census Area is 3.7.

11.15. The growth factors calculated in this way are a reasonable compromise solution to a problem which involves the precise definition of the hinterland of Cambridge. It is difficult to define the hinterland at present: it is even more difficult to define the hinterland in 50 years time.

11.16. In view of the Planning Authority's policy to provide employment and shopping in the Rural Zones in order to reduce their dependence on Cambridge, the population growth factors have been reduced in the following Zones:

A2	reduced to	1.30
C2	" "	1.40
D2	" "	1.40
E2	" "	1.50

11.17. The growth factors have been tabulated for each movement in Table 26.

Growth of 'Through' Traffic

11.18. For estimates of the growth of 'through' movements, the populations of the Rural and Suburban Zones have been combined and the population growth factor of the combined area calculated as follows:

<u>Population Growth Factor. 1956 - Ultimate</u>			
A	1.40	F	0.87
B	1.13	G	1.13
C	1.55	H	1.02
D	1.47	J	1.43
E	1.25	K	1.73

11.19. The total growth factor (G) to be applied to the non-stop movements through the Census Area between two Outer Zones (O₁ and O₂) has in general been determined from the following equation :

$$G = 2.9 \times P_{O_1} \times P_{O_2}$$

Where 2.9 is the growth due to increase in vehicle ownership in Cambridgeshire:

P_{O_1} is the population growth in Outer Zone O₁

P_{O_2} is the population growth in Outer Zone O₂.

11.20. The relationship between the product of the population of two Zones and the number of trips between them was investigated. The results are plotted graphically on Figure 25. It is possible to draw an envelope containing most of the points on this graph. It was noted, however, that the number of movements between several Zones seemed to be greater than would be normally associated with the populations of these Zones. This would indicate that the movements were either generated from outside the Cambridge hinterland (inter-regional movements) or were associated with a particular land use such as industry which would generate the additional trips.

11.21. It was possible to identify these movements and the future growth factor of such movements was modified as follows:

(a) For movements which include inter-regional traffic:

$$G = 2.9 \times P_{O_1} \times P_{O_2} \times C + 4.3 \times I$$

Where C is the proportion of the movement which would normally be

associated with Zones O_1 and O_2 . 4.3 is the ultimate growth of vehicle ownership in Great Britain. I is the proportion of the movement which is inter-regional.

(b) For the movements which include a high proportion of work trips:

$$G = 2.9 \times P_{O_1} \times P_{O_2} \times C + 2.9 \times W$$

Where W is the proportion of the movement associated with industry.

The average of the growth factors taken for non-stopping movements through the Census Area is 4.7. This is a compromise figure which falls within the following range of growth factors if different assumptions are made regarding the nature of the non-stop movements.

<u>Assumption</u>	<u>Growth Factor</u>
All non-stop movements are inter-regional movements stopping in the immediate hinterland of Cambridge. Such movements would not be affected by conditions in the rest of the Country and would depend on Cambridgeshire vehicle ownership (2.9) and increase in population of hinterland (say 30%).	$G = 2.9 \times 1.3 = 3.8$
All non-stop movements are inter-regional movements between areas outside Cambridgeshire. Such movements would not be affected by conditions in Cambridge. Growth would depend mainly on national growth of vehicle ownership.	$G = 4.3$
All non-stop movements are local movements between different parts of the immediate hinterland. These movements would be affected by growth of vehicle ownership in Cambridgeshire and the growth of population of <u>each</u> part of the hinterland.	$G = 2.9 \times 1.3 \times 1.3 = 4.9$

Growth of Internal Movements

11.22. Within the Census Area no allowance has been made for the reduction of population of Zones W,X,Y,Z and a growth factor of 2.9, based on vehicle ownership growth only, has been applied to all Urban-Urban and Urban-Central movements.

Summary of Growth Factors

11.23. The following are the average of the growth factors derived for each part of each movement in the manner described above.

<u>Movement</u>	<u>Average Growth Factor</u>
Non-stopping journeys through 1956 O & D census area	4.7 × 1956 movements
Journeys from outside the census area, stopping in the census area	3.7 × 1956 movements
Journeys within the census area	2.9 × 1956 movements

This results in an average ultimate growth factor on all journeys of 3.9 times the 1956 movements. This is approximately equivalent to 2.75 times the 1962 movements.

11.24. The growth factors reflect a large increase in vehicle ownership per head and a small increase in population. The method used to evaluate the proportion of each growth factor due to population increase tends to overestimate the effect of population as a traffic generator as compared with an evaluation based on the Average Factor, Frator, Furness or other iterative methods. The overall factors are therefore considered to be conservative, i.e. high.

12. GROWTH OF PARKING DEMAND

12.01. The growth factor to be applied to the free demand for parking in 1956 to give an ultimate parking requirement will lie between 2.9 and 3.7 depending on how much of the parking volume is generated within the Urban Zones and how much originates from outside the Census Area.

12.02. The 1956 Origin and Destination survey showed that two thirds of the trips stopping in Zone Z had origins in the Urban Zones and one third came from outside the Census Area (paragraph 9.12). Zone Z, however, is roughly equivalent

to only Area 1 of the parking analysis and Central Area parking takes place in a broad area around Zone Z. Similar data are not available for this area. If the proportions of internal to external traffic were the same for the whole of the parking area as for Zone Z, the parking growth factor would be 3.17.

12.03. The minimum assessment of the ultimate free demand for parking is 2.9 times the 1956 demand. A further 15% has been empirically added to this growth factor to allow for increase in the 'attractive' power of Cambridge and for some of the increase in population of the hinterland. The combined factor assumed for determining future parking demand is therefore 3.34, i.e. approximately the average of the above growth factors for journeys stopping in the Census Area (paragraph 11.24). This allows for the proportion of the stopping trips generated within the Census Area to those originating outside the Census Area to be 45:55 (cf. 67:33 Zone Z, paragraph 12.02 above).

12.04. In Areas 1 and 2, the free demand for parking will be limited by the proposed parking controls. The ultimate parking requirements in Area 3 and the fringe areas will therefore be the sum of 3.34 times the 1956 demand for parking spaces in these areas and that part of the demand in Area 1 and 2 which, because of the parking controls, is unable to park in Areas 1 and 2.

12.05. The demand for parking on a Saturday is between 7% and 30% greater than the demand on a Friday. Whilst it would be uneconomic to provide parking spaces to satisfy the extremes of the Saturday demand, it is nevertheless considered that some provision above that for the average weekday should be made in order to allow for a reasonable amount of additional parking on a Saturday.

12.06. The increase of the Peak Hour/Average Hour ratio (paragraph 9.04) in the period 1956-60 indicates that more people are using cars to come into Cambridge to work. This trend may well continue as the level of vehicle ownership rises and as the limitation on residential development in the City forces people to live further away from Cambridge and to travel greater distances to their work place. These movements will tend to increase the demand for all day parking facilities which must be allowed for in the following estimation of the ultimate number of spaces required.

13. FUTURE PARKING REQUIREMENTS

Ultimate Demand Areas 1 and 2 - Volume

13.01. The ultimate free demand for parking in Areas 1 and 2, assuming 3.34 times the 1956 volumes (paragraph 10.07) and the distribution between Duration Classifications unchanged, would be as follows:

<u>Duration</u>	<u>Ultimate Volumes</u>
less than 1 hour	17,500
1 - 2 hours	3,400
2 - 4 hours	2,400
4 - 6 hours	750
more than 6 hours	850
<hr/>	
Total volume	24,900 vehicles per 10 hour day 8 a.m. - 6 p.m.

This free demand for parking will be limited by the proposed parking controls.

Occupancy and Turnover per Space

13.02. The operation of a parking facility depends on a Demand-Occupancy-Turnover relationship and a practical design to cater for the movements associated with Turnover. The following Occupancy-Turnover relationships have been assumed to give a first estimation of the number of spaces required to meet the demand of the ultimate parking volume. The values of Occupancy and Turnover relate to a 10 hour period 8 a.m. - 6 p.m. and take into account the percentage Usage of parking space at times of peak accumulation.

<u>Duration range</u>	<u>Demand</u>	<u>Average Duration</u>	<u>Occupancy %</u>	<u>Turnover per space</u>
Less than 1 hour		25 mins.	52	12.5
1 - 2 hours		1½ hours	75	5.0
2 - 4 hours		3 hours	67	2.25
4 - 6 hours		5 hours	50	1.0
More than 6 hours		7½ hours	75	1.0

Ultimate Demand Areas 1 and 2 - Spaces

13.03. The above Occupancy-Turnover relationship has been used to estimate the free demand for parking space in Areas 1 and 2.

<u>Duration</u>	<u>Ultimate Spaces Required</u>
Less than 1 hour	1400
1 - 2 hours	680
2 - 4 hours	1070
4 - 6 hours	750
More than 6 hours	850
<hr/>	
Total 'free' demand	4750 spaces

Planning Proposals - Area 1 and 2

13.04. The Planning Authority and the City Council have made proposals to control parking in Areas 1 and 2 and to provide the following parking facilities:

Area 1 Streets	250 - Meter controlled limited 1 hour
	50 - Commercial loading bays
Area 2 Streets	250 - Meter controlled limited 2 hours
	50 - Commercial loading bays
Car Parks -	
Market Hill	60 - Limited 2 hours
Lion Yard	750 - Limited 4 hours
Park Street	500 - " " "
King Street	500 - " " "
New Square	270 - " " "
Coe Fen	100 - " " "
<hr/>	
Total Spaces	<u>2780</u>

A total of 1970 spaces will therefore be required in Area 3 or beyond to accommodate the overspill from Areas 1 and 2.

Redistribution of Parking Facilities - Area 1 and 2

13.05. It is considered that best use would be made of the parking facilities if most of the demand limitation in Areas 1 and 2 was applied to the 2-4 hour parkers. This could be achieved by providing more of the spaces for short term parking and by restricting the demand for parking longer than 2 hours, e.g. by higher charges.

As a surface car park in the centre of the town, Market Hill should be used by as many people as possible and therefore limited to 1 hour parking.

13.06. The following redistribution of the parking controls is recommended:

Facility	Duration Control	Duration							
		Less than 1 hr.		1 - 2 hrs.		2 - 4 hrs.		Over 4 hrs.	
		Spaces	Volume	Spaces	Volume	Spaces	Volume	Spaces	Vol.
Area 1 Streets	1 hr.	300	4500	-	-	-	-	-	-
Area 2 Streets	2 hrs.	175	2630	125	750	-	-	-	-
Market Hill	1 hr.	60	600	-	-	-	-	-	-
Park Street	4 hrs.	200	2000	135	540	165	370	-	-
King Street	4 hrs.	200	2000	135	540	165	370	-	-
Lion Yard	4 hrs.	390	3900	195	780	165	370	-	-
New Square	4 hrs.	75	750	60	240	135	300	-	-
Coe Fen	4 hrs.	-	-	30	120	70	160	-	-
Limited Supply		1400	16380	680	2970	700	1570		
Free Demand		1400	17500	680	3400	1070	2400	1600	1600

13.07. In this way 94% of the less than 1 hour, 87% of the 1-2 hour and 66% of the 2-4 hour parkers are provided for.

Design of New Facilities

13.08. The characteristics of the proposed parking facilities in Areas 1 and 2 are summarised in the following table:

Facility		Spaces	Parking Demand catered for		Occupancy		Turnover	
			Average Duration	Volume	%	Av.		Av.
Streets	Area 1	300	20 mins.	4500	50		15.0	
	Area 2	300	35 mins.	3380	66	54	11.3	12.9
	Market Hill	60	30 mins.	600	50		10.0	
Off Street Car Parks	Park St.	500	1 hour	2910	58		5.8	
	King St.	500	1 hour	2910	58		5.8	
	Lion Yard	750	50 mins.	5050	56	58	6.7	6.1
	New Square	270	70 mins.	1290	57		4.8	
	Coe Fen	100	2hr.20min.	280	66		2.8	

13.09. It is considered that by strict enforcement of parking regulations and by very high charges for parking longer than four hours, it will be possible to eliminate all long term parking from the Central Area such that the net demand for parking in the centre is as in the above table.

13.10. The average Duration for which facilities will be provided is 25 minutes on the streets and 1 hour in the off-street car parks. For this analysis Market Hill has been included with the other short term parking facilities on the streets. The average Duration of people parking for less than 1 hour in Market Hill and all the Car Parks has been increased from 20 minutes to 30 minutes to allow for some additional time to enter and leave the parking facility.

13.11. A reasonable and practical level of Occupancy, well within the range normally experienced in America and in Europe, has been assumed for the new facilities. The nature of the short-term demand and the level of Occupancy assumed lead to average Turnovers of 12.9 on the streets (including Market Hill) and 6.1 for the Car Parks.

13.12. Car Parks and other off-street parking facilities have hitherto usually been built to cater for the long term parker, i.e. for an average demand of between 4 and 8 hours. This is the case in America where the average Turnover for off-street Car Parks is seldom more than 3. Higher Turnovers in the range of 6 to 10 have been achieved occasionally in America at times when the demand has been for shorter term parking.

13.13. The nature of the demand to be met by the off-street parking facilities in the centre of Cambridge is therefore very different from that which is normally associated with similar facilities in other urban areas. The relatively high turnover figures must be catered for in the design of the parking facilities such that the movements associated with the high turnover figures can take place. The entrances and exits, the pedestrian movements, lighting, parking area, and method of operation must all be designed with the object of meeting the specific demand to be served. In particular, if Lion Yard is to be an underground car park at one level, an area of at least 200,000 sq. ft. will be required with at least two entrances and exits.

13.14. These aspects were taken into consideration in the design of a multi-storey car park recently constructed in Milan where the demand for parking was for an average Duration of less than 1 hour. In recent months an average Turnover of between 6 and 7 vehicles per parking space per day has been achieved with an occupancy of 50%.

Area 3 and Fringe Parking

13.15. In 1956 the peak accumulation in Area 3 was 158 vehicles. Since there are no proposals for the control of parking which will alter the pattern of free demand in Area 3, the growth factor can be applied direct to the demand for spaces as represented by the 1956 peak accumulation count to give an ultimate demand of $3.34 \times 158 = 530$ spaces.

13.16. The demand for parking was not measured outside Areas 1, 2 and 3 in 1956. In 1962 the peak accumulation in the Fringe Area, excluding the Fitzroy Street shopping area, was 142 vehicles on a Friday afternoon (paragraph 10.04). As the average increase between 1956 and 1962 was 30% it is reasonable to assume an ultimate demand of 3.34×1956 pattern is equivalent to 2.6×1962 pattern. On this basis the ultimate demand in the Fringe Area will be approximately 370 spaces.

13.17. The ultimate requirements for parking space in Area 3 and the Fringe are therefore:

Space for long-term parkers having business in Areas 1 and 2 (para. 13.04)	1970	
Allowance for increase in demand for all-day parking	100	
Space for full demand for parking in Area 3	530	
Space for full demand for parking in Fringe Areas	370	
Total parking requirement	2970	spaces

13.18. The following off-street parking facilities in Area 3 and the Fringe are proposed in the Development Plan:

<u>Car Parks</u>	<u>Spaces</u>	
Saxon Street	150	
Newtown	300	
Pound Hill	200	
<u>Additional Sites to be provided</u>		
Parkers Piece/Newtown Area	750	
Emmanuel Road/Clarendon Street Area	500	(in addition to replacement for New Square)
Pound Hill/Castle Hill Area	500	
West Cambridge	300	
Total facilities to be provided	2700	spaces

Fitzroy Street Shopping and Business Area

13.19. The peak accumulation in the Fitzroy Street shopping and business area in 1962 on a Friday afternoon was 330. Assuming 2.6 x 1962 pattern (paragraph 13.16) the ultimate demand in this area will be approximately 850 spaces. Detailed proposals for this area have not yet been made, but two sites are allocated in the Development Plan for Car Parks to serve the shopping area and additional facilities can be made available as required in the course of redevelopment of the area.

Summary of Parking Requirements

13.20. If the substance of Cambridge is considered to be an area bounded by the River Cam in the North, Queens Road in the West and the general line of Fen Causeway, Lensfield Road, Gonville Place, East Road and Chesterton Bridge in the South and East, then the above ultimate demands total 6,600 spaces. To this it would be reasonable to add 650 spaces (10%) on an extremely long term basis catering for peak fluctuations of Saturday parking. This results in a total demand within that area of 7,250 spaces, which demand the Development Plan can meet.

13.21. The provision of the Area 3 and the Fringe Area parks is of equal importance to the provision of off-street facilities in the Central Area. It is estimated that even on present day parking figures, over 500 long term parkers will immediately be thrust into the Fringe Area. If the car parks are not provided these parkers will increase the congestion already caused by parking on streets in Area 3.

13.22. The progressive implementation of parking provisions should be flexible and based on continued surveys. This applies particularly to such aspects as controlled experiments, flexibility of detailed planning, flexibility of parking charges and the use of modern electronic equipment which could go so far as to advise in-coming drivers of their optimum place to park. Since the ultimate parking demand considered is not likely to be reached until near the turn of the century, there is ample scope for the progressive implementation of the various provisions based on up-to-date survey data and using modern planning and traffic engineering techniques.

14. FUTURE MOVEMENTS TO THE CENTRE

Redistribution of trip ends

14.01. The proposed controlled parking area will cause a redistribution of the trip ends of movements to Zones Y and Z of the 1956 Origin and Destination Survey.

14.02. To determine the pattern of this redistribution, estimates have been made of the future movements to the controlled parking area, which for the purposes of traffic movement has been called Zone P, and to a Zone Q which comprises the balance of Zone Y so that Zone P + Zone Q is equal to Zone Y + Zone Z.

14.03. Before evaluating the future pattern of movements to Zones P and Q, it was necessary to estimate the 1956 pattern within Zone Y, since the 1956 Origin and Destination Survey does not provide any direct measure of these movements.

14.04. Zone Y has been divided into six sub-zones, $Y_1 - Y_6$, as shown on Figure 26. The following estimate of the distribution between these sub-zones of the trip ends in Zone Y has been built up from consideration of known parking habits, the distribution of population and industrial land use and the position of the railway station, regional government offices and other points of high traffic generations:

	Y_1	Y_2	Y_3	Y_4	Y_5	Y_6	Total
Distribution %	15	20	10	17	24	14	100

The centre of traffic generation of Zone Y based on this distribution between the sub-zones is Gonville Place.

14.05. The distribution by entry point of the movements to Zone Y is as follows:

<u>Entry point</u>	<u>Distribution (%)</u>
Victoria Avenue	17.1
Magdalene Bridge	6.1
Silver Street	5.4
Fen Causeway	7.9
Trumpington Road	10.7
Hills Road	13.4
Mill Road	6.8
Newmarket Road	12.5
Total	<u>79.9</u>

The balance (20.1%) of the movements to Zone Y consists of the Zone Z to Zone Y movements.

14.06. From considerations of choice of river crossing, distance and the relative attraction between trip ends within Zone Y and the points of entry to Zone Y, the following distribution by point of entry of movements between the main points of entry and sub-zones have been drawn up.

Movement from	To Sub-Zone (% total movement to Y)						
	Y ₁	Y ₂	Y ₃	Y ₄	Y ₅	Y ₆	Total Zone Y
Victoria Avenue	5.7	2.5	3.1	2.8	2.0	1.0	17.1
Magdalene Bridge	2.7	1.6	0.5	0.4	0.6	0.3	6.1
Silver Street	1.3	3.5	0.2	0.3	0.1	0	5.4
Fen Causeway	0	0.2	0.8	1.9	2.0	3.0	7.9
Trumpington Rd.	0.6	3.9	0.2	0.6	2.4	3.0	10.7
Hills Road	0.8	3.6	0.5	1.4	4.5	2.6	13.4
Mill Road	0.3	0.8	0.3	1.5	3.5	0.4	6.8
Newmarket Road	1.6	0.8	2.4	4.0	3.3	0.4	12.5
Central Zone Z	2.0	3.1	2.0	4.1	5.6	3.3	20.1
Total	15.0	20.0	10.0	17.0	24.0	14.0	100.0

14.07. The application of this estimation of the distribution of movements within Zone Y to the 1956 values for the trips to Zone Y gives the following comparison between measured traffic volumes on the roads in the zone and the sum of the movements allocated to the roads from the Origin and Destination analysis.

	Traffic Volume 2 p.m. - 6 p.m.	Sum of O and D Movements Allocated	Difference %
Emmanuel Road	2272	2503	10
Parkside	2188	2167	1
Gonville Place	2976	2666	10
Lensfield Road	2336	2241	4
East Road	1492	1668	12

The comparison shows fair agreement and confirms that the estimate of distribution of movements within Zone Y is reasonable.

14.08. The movements to sub-zones Y₁ and Y₂ have been added to the movements to Zone Z to give the movements to the revised central area Zone P. The movements to sub-zones Y₃ - Y₆ have been combined to give the movements to Zone Q. The movements (two way) in the period 2 p.m. - 6 p.m. in 1956 to Zones P and Q are as follows:

Zones	A	B	C	D	E	F	G	H	J	K	W	X	P
P	597	306	130	1107	992	281	716	288	383	197	1977	822	
Q	299	140	161	888	1296	818	1450	180	262	82	912	676	2650

Control of Movements to Zone P

14.09. The 'ultimate' movements to Zone P will be limited by the parking restrictions in the area.

14.10. The parking provisions in Zone P allow for a parking volume of 20,920 vehicles in a ten hour day 8 a.m. - 6 p.m. This parking volume will generate an average of

$$\frac{20,920 \times 2}{10} = 4184$$

trips per hour to and from Zone P.

14.11. The parking surveys carried out in 1961 and 1962 indicated that the peak accumulation of private parking in Zone P was 894 vehicles. Of this total 234 spaces were in Zone Z and 660 spaces in the adjacent areas Y₁ and Y₂. The Planning Authority propose to restrict further increase in private parking facilities within Zone Z which may at some future date be developed as a precinct area used primarily by pedestrians. It would however be realistic to allow a nominal 20% increase in the present number of private parking spaces in Zone Z to give an ultimate provision of 280 spaces. Although the growth of private parking in the rest of Zone P will be relatively unrestricted, it is considered that from limitations of space available the private parking facilities are unlikely to increase by more than 100%, i.e. to 1320 spaces. The total number of private parking spaces in Zone P may therefore be expected to increase ultimately to 1600. If it is assumed that each private parking space has a turnover of 1.5 in the ten hour period 8 a.m. to 6 p.m., then each space would generate

$$\frac{1.5 \times 2}{10} = 0.3$$

trips per hour and private parking would ultimately generate a total of 480 trips per hour in Zone P.

14.12. Comparisons between the results of the parking and the Origin and Destination Surveys have shown that the parking surveys do not account for all the stopping trips intercepted by the O & D Survey (paragraph 7.19). Even if some allowance is made for trips generated by private parking, there is evidence that there is a considerable number of visiting trips which create traffic flow on the streets but do not cause any significant additional parking demand. These visiting trips include tourists, taxis dropping passengers, people posting a letter, and others making short calls for many purposes. In 1956 the parking survey identified a total of 6591 trips generated by public parking in Areas 1 and 2 (equivalent to Zone P) in the 4 hour period 2 p.m. to 6 p.m. Private parking (894 spaces)

would generate a total 1130 trips in a similar period based on the turnover assumptions in paragraph 14.11 above. The total generated by public and private parking is therefore 7721 trips. The redistributed results of the 1956 Origin and Destination Survey (paragraph 14.08) identify a total of 10,446 stopping trips to and from Zone P in the same period, i.e. a total of 2725 trips is not accounted for by the parking survey. These are assumed to be visiting trips and were equivalent to 650 trips per hour in 1956. The ultimate number of visiting trips to Zone P has been assumed to be controlled by the proposed parking regulations to twice the 1956 movements, i.e. to 1300 trips per hour (two way movement).

14.13. The total ultimate number of trips per hour to and from Zone P is estimated as follows:

<u>Generated by</u>	<u>Trips per hour</u>
Streets and public car parks	4184
Private car parks	480
Visiting trips	1300
Total	5964 trips per hour

This hourly movement is equivalent to a movement of 25,000 trips in the four hour period 2 p.m. - 6 p.m. for which the existing traffic has been analysed.

14.14. The effect of controlling the movements to Zone P to an ultimate of 25,000 trips is as follows:

Zone	1956 Movement	Growth Factor	Ultimate Movement	Movement Allowed
A	597	3.8	2270	1640
B	306	3.2	970	700
C	130	4.1	533	390
D	1107	4.0	4428	3200
E	992	3.8	3765	2730
F	281	2.6	731	530
G	716	3.3	2362	1710
H	288	2.9	835	600
J	383	4.9	1875	1360
K	197	5.0	985	710
V	1977	2.9	5730	4150
X	822	2.9	2382	1720
Q	2650	2.9	7680	5560
Total	10446		34546	25000

Revised Movements to Zones W, X and Q

14.15. It is assumed that movements which are prevented from entering Zone P will terminate in Zones W, X or Q depending on the direction of approach. The revised distribution of ultimate movements to these Zones is as follows:

	A	B	C	D	E	F	G	H	J	K	W	X	P
W	3590	406	106	1063	650	353	1888	1540	4636	1710	-	-	-
X	57	1140	1093	1238	426	86	204	122	260	45	1024	-	-
P	1640	700	390	3200	2730	530	1710	600	1360	710	4150	1720	-
Q	1136	448	660	4778	5960	2326	5437	522	1283	410	2645	1960	5560

14.16. The total ultimate movement to Zone Q is 33,125 trips in a four hour period 2 p.m. - 6 p.m. There is not enough information available by which an estimate can be made of the parking capacity of Zone Q or the future requirements for public parking.

As street parking spreads, however, the parking position should be constantly reviewed and if street parking starts to interfere with traffic movement then the parking control zone must be extended and further off-street car parks provided.

Distribution of Trip Ends within Zone P

14.17. In order to estimate the ultimate traffic flow on the Central Area streets, Zone P has been divided up into eight sub-zones P1 to P8 as shown on Figure 27.

14.18. The trips generated by public car parks have been distributed between the sub-zones in accordance with the location of the new car parks. The trips generated by street parking have been distributed in accordance with the proposed distribution of the parking meter facilities in Zone P. The trips generated by private parking have been distributed according to the present known distribution of private parking facilities.

14.19. Sub-zones P1 to P4 comprise the Origin and Destination Survey central Zone Z and the area within which it is hoped some form of pedestrian precinct may ultimately be created. Comparisons between the results of the surveys of public and private parking and Origin and Destination Surveys in 1956 have shown that there are about 2000 visiting trips to Zone Z which were not accounted for by the parking surveys. If it is assumed that the parking controls will limit the growth of such visiting trips to approximately twice those observed in 1956, the ultimate number of visiting trips to Zone Z would generate 1000 trips per

hour. The terminations of these visiting trips to Zone Z have been distributed between sub-zones P2, P3 and P4 according to the observed distribution of street parking in 1961 (P1 is the Park Street Car Park). The balance of the visiting trips to Zone P, i.e. 300 trips per hour, has been distributed between Zones P5 to P8 in a similar manner.

14.20. The resulting distribution of trip ends per hour (two way movement) within Zone P is summarised as follows:

Subzone	Public Parking		Private Parking	Visiting Trips	Total (%)
	Car Parks	Streets			
P1	582	-	-	-	582 (10)
P2	-	542	30	230	802 (13)
P3	120	180	5	540	845 (14)
P4	1010	300	49	230	1589 (27)
P5	56	223	207	50	536 (9)
P6	-	138	98	100	336 (6)
P7	582	117	14	50	763 (13)
P8	258	76	77	100	511 (8)
Total	2608	1576	480	1300	5964 (100)

14.21. In order to estimate the future traffic on the Central Area streets, each movement to Zone P has been assigned to each of the eight sub-zones in the proportions determined above.

PART V - FUTURE ROAD PROPOSALS

15. ASSIGNMENT

15.01. The usage by traffic of the new road proposals has been estimated by assigning a proportion of each traffic movement identified to the new road facilities on a time ratio method. The method takes into consideration the relative journey times via the existing route and the new facility. The proportion of traffic diverted to the new facility is obtained from an assignment graph.

15.02. The results of the February 1962 Journey-Time Survey have been used to determine journey times for the existing movements. No reduction has been made to these journey times to allow for the increase in traffic since 1956. The 1962 journey times were measured in February, an off peak time for traffic, and are considered to be equivalent to May-June journey times in 1956.

15.03. The assignment curve has been drawn up from consideration of the usage in 1956 of existing alternative routes. For each movement, the average time ratio of all the alternative routes with respect to the most heavily used route was plotted graphically against the proportion using the popular route. The resulting assignment curve is shown on Figure 28.

15.04. Journey times on the new facilities have been determined from the following average speeds. The net speeds are based on an average maximum running speed in a restricted speed area with an allowance for delays of 10 seconds per minute of running time.

Road	Speed Limit m.p.h.	Average max. running speed m.p.h.	Net Speed allowing for delays m.p.h.
Chesterton Bridge	40	37	30.8
Inner Relief Road	30	27	22.5
(Histon Road - Trumpington Road)	30	27	22.5
New West Road	30	27	22.5
Eastern By-pass	30	27	22.5
Queens Road	20	18	15.0

15.05. Successive assignment has not been used to estimate the usage of more than one new facility. Where more than one new facility is provided, existing movements have been assigned to the new road system as a whole. It was considered that assigning to alternative new facilities progressively allocated too much traffic to the last built facility. The movement between two Zones has been assigned to the existing routes and the new facilities in proportion to the relative attraction of each facility vis-à-vis the next slowest route as determined from the assignment curve.

16. DESIGN-HOUR VOLUME AND CAPACITY

16.01. Traffic movements for the period 2 p.m. - 6 p.m. have been assigned to the new road proposals. The design-hour volume for determining the physical form of the new roads has been taken as the peak hour on a 9½ hour (8.30 a.m. - 6 p.m.) basis. The four hour flow 2 p.m. - 6 p.m. has been taken as 4.2 times the hourly average of the 9½ hour flow.

16.02. The physical form of the future road system has been determined from considerations of the design-hour volume in relation to the following design capacities.

<u>Road</u>	<u>Design Capacity Vehicles per hour</u>
Dual Carriageway - 2 lane - restricted access	4000
Single Carriageway - 36 ft. width - clearway	1600-1800
Single Carriageway - 36 ft. width - free access and kerbside parking	1150
Single Carriageway - 24 ft. width - clearway	1000
Single Carriageway - 24 ft. width - with free access and kerbside parking	720

It must be noted, however, that the capacity of a road between two intersections in an urban area is dependent on the capacity of the intersections.

17. ASSESSMENT OF DEVELOPMENT PLAN PROPOSALS

17.01. The traffic which will use the roads proposed in the Development Plan, and the subsequent relief to the existing system, have been estimated from considerations of the volume of the traffic movements observed in 1956 and the assignment curve established from the 1956 pattern of choice of alternative routes.

17.02. The pattern of 'ultimate' traffic volumes was established from considerations of the re-routed 1956 movements and the appropriate 'ultimate' growth expansion factors.

17.03. The physical form of the new road proposals was determined from considerations of the ultimate traffic volume and the design capacities.

17.04. The redistribution of the 1956 flows between the new facilities and the major roads of the existing system, the pattern of 'ultimate' traffic volumes and

the physical form of the new roads are summarised in Table 27. The ultimate traffic flow on the future road system is also shown on Figure 29. The physical form of the new road system and alternatives are shown on Figure 30. The main function of each part of the proposed road system is shown on Figure 31.

17.05. Estimates of construction costs of the new road facilities, where given, are approximate and for the purpose of comparison only. Property acquisition costs have not been included.

18. CHESTERTON BRIDGE ROUTE

Description of Routes

18.01. The Chesterton Bridge route comprises a new river crossing joining Newmarket Road to Chesterton Road and a link between Chesterton Road and Milton Road. In assessing the traffic usage of this route it has been assumed that East Road will be improved such that the average speed including delays is increased from the present value of 16.7 m.p.h. to 22.5 m.p.h.

Relief to existing Road System

18.02. If Chesterton Bridge is the first new facility constructed, the traffic on the existing river crossing routes will be reduced by the following amounts.

Victoria Avenue	50%
Magdalene Bridge	9%
Queens Road	16%

18.03. The main function of the new bridge will be to take a considerable proportion of the traffic at present being carried by Victoria Bridge. Little relief will be afforded to the congestion in the centre of the city. Chesterton Bridge will serve as the main south to north-east and south to north routes and will provide an additional access road for movements to Zone Q from Zone W and from the outer Zones north of the river.

18.04. Initially Chesterton Bridge will attract a major proportion of east-west river crossing movements which are at present using Victoria Avenue. The northern sections of the Inner Relief Road, however, will be a more direct route for these movements and after these sections are opened and before access from Newmarket Road at Four Lamps is restricted (19.06) the traffic on Chesterton Bridge will reduce by 24%. Once access to the Inner Relief Road is controlled by the construction of

the King Street underpass, the main east-west movements will again use Chesterton Bridge and the traffic on the new crossing will increase by 22% (traffic on Chesterton Bridge before construction Inner Relief Road crossing = 100%).

'Ultimate' Traffic Flow and Physical Form

18.05. The estimated ultimate average traffic flow on Chesterton Bridge is 2,750 vehicles per hour on the river crossing and 830 vehicles per hour on the Milton Road link. The new river crossing should therefore be constructed as a dual carriageway, although a single carriageway will provide sufficient capacity for the traffic on the Milton Road link.

18.06. East Road will be an essential part of the Chesterton Bridge route and the full benefit of the river crossing will not be gained unless East Road is improved at the same time. A dual carriageway will be required to provide sufficient capacity for an ultimate traffic flow of 3,100 vehicles per hour.

18.07. The diversion of all east-west river crossing movements to the Chesterton Bridge Route will place additional traffic volumes on Mitchams Corner junction and Chesterton Road (east). Some form of grade separation should be provided at Mitchams Corner and, although Chesterton Road (east) is generally of sufficient width to provide the capacity necessary for an ultimate flow of 1,790 vehicles per hour, it is considered that from safety considerations a dual carriageway would be desirable.

18.08. The composition of the traffic using Chesterton Bridge before and after the construction of the Inner Relief Road is estimated as follows:

Movements	Before construction Northern Section Inner Relief Road	After construction Northern Section - Inner Relief Road	
		No control of access	Access at Four Lamps limited
Outer Zone to Outer Zone	26%	22%	35%
Outer Zone to Urban Zone W or X	19%	21%	26%
Outer Zone to Urban Zone P or Q	41%	38%	30%
Urban Zone W or X to Urban Zone P or Q	14%	19%	9%
Total	100%	100%	100%

Priority and Cost

18.09. The proposed Chesterton Bridge scheme is a matter of the highest priority. This is due not only to its own traffic relieving effect but also as a pre-requisite to the solution of the Central Area problem. Preliminary work on the scheme has already been started but it is unlikely that the new river crossing will be open to traffic before 1966.

18.10. The cost of construction of the Chesterton Bridge route and the improvements to East Road and Chesterton Road (east of Mitchams Corner) has been estimated as follows:

Section	Construction	Construction Costs
East Road	Improve existing single carriageway	£45,000
	Dual single carriageway	£40,000
Chesterton Bridge	New dual carriageway	£700,000
Milton Road link	New single carriageway	£80,000
Mitchams Corner junction	Grade separation (underpass)	£350,000
Chesterton Road (east of Mitchams Corner)	Dual existing single carriageway	£20,000
Total		£1,235,000

19. INNER RELIEF ROAD

Description of Route

19.01. The Inner Relief Route may be considered as seven separate links made up of two sections of new road and five sections which follow the general alignment of existing streets as follows:

- | | |
|-----------|--|
| Section 1 | A new road from the junction of Huntingdon Road along a line to the back of Shire Hall to a new junction with Chesterton Road. |
| Section 2 | <u>A new river crossing and approach road from the above junction with Chesterton Road, along the general line of the western boundary of Jesus Green to a new junction with Jesus Lane.</u> |
| Section 3 | Jesus Lane from the junction with the new river crossing above to Four Lamps. |

Section 4	Emmanuel Road from Four Lamps to the junction with Parker Street.
Section 5	Parker Street and Parkside from the junction with Emmanuel Road to the junction with Gonville Place.
Section 6	Gonville Place from the junction of Parkside to the junction with Hills Road.
Section 7	Lensfield Road from the junction with Hills Road to the junction with Trumpington Road.

Function

19.02. The Inner Relief Road will have the following manifold functions:

- (i) to provide canalized access to the Central Area
- (ii) to distribute between the access points traffic to the Central Area streets and car parks
- (iii) to relieve the Central Area streets of non-stopping through traffic (both inter-regional and local)
- (iv) to act as a distributor road for local traffic stopping in the south-east fringe area adjacent to the centre (Zones Y1 and Y2).

19.03. Each section of the Inner Relief Road will act differently as other road proposals in the Development Plan are implemented. It is therefore difficult to consider this proposal as an entity. In the following appraisal the route is divided into two Parts. The Northern Part comprises Sections 1 to 3 above and the Southern Part is made up of Sections 4 to 7 south of the Four Lamps Junction.

Northern Sections 1, 2 and 3

(1) Function

19.04. Jesus Lane and the new river crossing will be an attractive route not only for traffic at present using the Central Area streets but also for east-west movements at present using Victoria Avenue, which will initially be attracted by the Chesterton Bridge route. The Northern Part of the Inner Relief Road can fulfil the required functions and this additional function up to about 1968, by which time the traffic on Sections 2 and 3 will have increased to such a volume as to require either a dual carriageway or additional physical controls.

19.05. The construction of a dual carriageway along the line of Sections 2 and 3 of the Inner Relief Road would not be consistent with the policy of the Development Plan to maintain the traditional character of the University Town. It is considered that the planning policy and physical limitations of the route dictate

that the new river crossing and that part of the Inner Relief Road along Jesus Lane should be limited to a single carriageway of modest proportions, i.e. there should be no need to widen Jesus Lane. Consequently, controls must be applied to these Sections such that they will act in a reduced capacity and in particular will be relieved of the east-west river crossing movements.

19.06. It is therefore considered that by 1968 an underpass should be provided from Newmarket Road to King Street and that direct movements from Newmarket Road to Jesus Lane and Victoria Avenue should be stopped. Then all east-west movements would again be taken by Chesterton Bridge. As noted above, this would provide an additional load on the existing road system north of the river and in particular at Mitchams Corner Junction.

19.07. By about 1976, however, the growth of traffic on the Inner Relief river crossing and Jesus Lane will again cause congestion on the single carriageway. At this stage a further limitation of the functions of these Sections of the Inner Relief Road will need to be accepted. Ultimately a single carriageway can only provide sufficient capacity for Sections 2 and 3 to act as an access and distributive road to the Central Area. This can be achieved by improving the Chesterton Lane/Victoria Avenue link to Four Lamps such that all the rural 'through' traffic, most of the local 'through' traffic and some of the distributive traffic to the centre will be diverted onto Victoria Avenue. The improvements necessary by that time (1976) will be a dual carriageway for the Chesterton Lane/Victoria Avenue route and some form of grade separation at the junction of Chesterton Road and the Inner Relief Road (Sections 1 and 2) such that priority will be given to movements between Section 1 of the Inner Relief Road and Chesterton Road.

19.08. In view of this limitation of function it seems that a flowing alignment for Sections 2 and 3 of the Inner Relief Road will not be essential. Accordingly the Park Street alignment of the southern approach to the new river crossing as proposed by the City Council appears to be adequate in lieu of the line infringing on Jesus College hockey pitch.

(11) Relief to existing system

19.09. The solution to the Central Area traffic problem, as will be seen below, is based on the positive control of north-south movements and in particular those which have no business in the centre. As soon as the new river crossing section of the Inner Relief Road has been provided, Magdalene Bridge can be closed to vehicular traffic and the first step taken towards a minimisation of the traffic in the Central Area.

19.10. The change in traffic flow on certain main roads after the completion of each stage of the road proposals associated with the Northern Part of the Inner Relief Road is estimated as follows. It is assumed that Chesterton Bridge will be opened before this Part can be completed.

Stage	Victoria Avenue	Queens Road	Magdalene Bridge	Chesterton Bridge	Inner Relief River Crossing
Existing	100%	100%	100%	-	-
After Completion of Chesterton Bridge	- 50%	- 16%	- 9%	100%	-
After Completion of Northern Section Inner Relief Road	- 2%	- 23%	- 91% (closed)	- 24%	100%
After Construction Kings Street Underpass at Four Lamps	- 12%	no change	-	+ 22%	- 15%
After Improvement of Chesterton Lane Victoria Avenue Link	+ 33%	+ 13%	-	no change	- 33%
Balance	69%	74%	-	98%	52%

All percentage changes relate to original 100% flow on each road.

(iii) Ultimate flows

19.11. The ultimate flows on the main roads north of Four Lamps after the completion of all stages of the Development Plan are estimated as follows. The construction necessary to provide for the ultimate flows is also shown.

Section	Average ultimate flow vehicles per hour	Description
<u>Inner Relief Road</u>		
Section 1	1140	Single Carriageway
Section 2 New River Crossing	1010	Single Carriageway
Section 3 Jesus Lane	1540	Single Carriageway
<u>Victoria Avenue link</u>		
Chesterton Road (west of Mitchams Corner)	2060	Dual Carriageway (two lane)
Victoria Avenue	2100	Dual Carriageway (two lane)

19.12. The change in composition of the traffic on the river crossing, Section 2 of the Inner Relief Road, will be

Movement	No control of access at Four Lamps	After completion of King Street Underpass	After Improvement of Chesterton Lane/Victoria Avenue and introduction of further central area controls (para. 20.04)
Outer Zone/Outer Zone through traffic	29%	16%	Nil
Local through traffic associated with fringe areas Zones P5 to P8	15%	18%	18%
Local through traffic associated with Zone Q	30%	35%	15%
Central area traffic associated with Zones P1, P2 or P3	15%	18%	53%
Central area traffic associated with Zone P4	11%	13%	14%
Total	100%	100%	100%

(iv) Priority and Cost

19.13. The Northern Part of the Inner Relief Road is a pre-requisite to the solution of the Central Area traffic problems. It will result in a minimisation of traffic in the Central Area without seriously reducing access facilities and

could pave the way for the ultimate emergence of a central precinct used essentially by pedestrians. The provision of this part of the Inner Relief Road is thus a matter of the highest priority. Its priority was rated equally by Sir William Holford in 1950, although no work has yet been done on the project. Allowing time for scheme stage negotiations, land acquisition, the hearing of local objectors, the final design work and time for construction, even if a decision to proceed with this new road were taken now (1962), the new river crossing could not possibly be opened to traffic within five years, i.e. before 1967.

19.14. Plans for the King Street underpass are of almost equal priority since this additional facility should be provided by 1968, i.e. only one year after the opening of the new Sections (1 and 2) of the Inner Relief Road. The improvements to the Victoria Avenue link and the provision of a grade separated junction at Chesterton Lane are of lesser priority but should be completed by 1976.

1915. The estimated costs of construction of the road works and bridgeworks associated with the Northern Part of the Inner Relief Road are as follows:

Section	Construction	Construction Costs
<u>Inner Relief Road</u>		
Section 1	New single carriageway	£55,000
Chesterton Lane Junction	Grade separation - Flyover	£150,000
Section 2		
New river crossing	New single carriageway	£325,000
Section 3		
Jesus Lane	Single carriageway - substantially as existing	
Four Lamps Junction	Grade separation King Street underpass	£250,000
<u>Victoria Avenue Link</u>		
Chesterton Road from the junction with the Inner Relief Road to Mitchams Corner	Dual existing single carriageway	£30,000
Victoria Avenue	Dual existing single carriageway including new river crossing	£225,000
Total construction costs		£1,035,000

19.16. The cost of improving the junction of the north end of Section 1 of the Inner Relief Road with Huntingdon Road has been included in the costs of construction of Section 1. The cost of improving Mitchams Corner junction has been included in the estimates for the Chesterton Bridge route. (see paragraph 18.10).

Southern Sections 4, 5, 6 and 7

(i) Function

19.17. The whole of the Southern Part will act as a distributive road for vehicles approaching the Central Area from the south but having destinations in the northern half of the Precinct area (Zones P1 and P2, Figure 27) such that they wish to enter from Jesus Lane. Emmanuel Road together with Sections 2 and 3 will act in a similar manner distributing traffic entering from the north and having destinations in the southern half of the Precinct area (Zone P4).

19.18. The southern Sections as a whole will also act as a distributive road for all movements associated with the fringe areas P4 to P 8. Parker Street and Parkside will form a direct radial access for traffic wishing to enter Zones P3 and P4 from Hills Road. Lensfield Road and Gonville Place will be important links in the main through traffic routes to the north and east via Chesterton Bridge and to the north and west via Victoria Avenue. The latter movement will also be carried on the Emmanuel Road and Parkside Sections.

19.19. The success of the Southern Part of the Inner Relief Road functioning in this manner will be closely related to the provision of the Northern Part, the closure of Magdalene Bridge and other measures (see paragraph 20.04) specifically designed to prevent through and local distributive traffic from using the Central Area streets.

(ii) Ultimate flows and physical form

19.20. The ultimate flows on the four Sections of the Southern Part of the Inner Relief Road are estimated as follows:

<u>Section</u>	<u>Average ultimate flow - vehicles per hour</u>
Section 4 - Emmanuel Road	3190
Section 5 - Parkside	3160
Section 6 - Gonville Place	3690
Section 7 - Lensfield Road	2330

19.21. A dual carriageway throughout the whole length of the Southern Part of the Inner Relief Road will be necessary in order to provide sufficient capacity for the above ultimate flows.

19.22. The composition of the traffic on the southern Sections is estimated as follows:

Movement	Section 4 Emmanuel Road	Section 5 Parkside	Section 6 Gonville Place	Section 7 Lensfield Road
Outer Zone/Outer Zone through traffic	9%	9%	17%	19%
Local through traffic not stopping in Zone P or Q associated with an origin or destination in Zones W or X	8%	9%	10%	10%
Local distributive traffic associated with Zones Q, P5, P6 and P8	37%	39%	52%	49%
Central area distributive traffic associated with the southern half of precinct area Zones P3 and P4	13%	14%	2%	9%
Central area distributive traffic associated with the northern half of precinct area Zones P1, P2 and P7.	33%	29%	19%	13%
Total	100%	100%	100%	100%

(iii) Alternative to dualling Emmanuel Road and Parkside

19.23. The present alignment of Emmanuel Road and Parkside will not be suitable for a multipurpose route carrying large volumes of traffic. If this section of the Inner Relief Road is to function as proposed above, the alternative alignment (Figure 32) cutting across the existing residential area south-west of New Square would be preferable for dual carriageway construction. The existing Parker Street and Emmanuel Street could then serve as access to Zones P4 and P5 only.

19.24. If a dual carriageway and this alignment is not acceptable, it would be possible to let the existing single carriageways function as access and

distributive roads to the Central Area and to provide a new single carriageway along a general line to the east of New Square linking Gonville Place direct to Victoria Avenue. Such an alternative could also be associated with a realignment of the southern end of Victoria Avenue and help separate the increasing volume of traffic movements which are at present taking place at Four Lamps. The general alignment of this alternative is also indicated on Figure 32.

(iv) Priority and Cost

19.25. The improvements to the southern sections of the Inner Relief Road, particularly those associated with Emmanuel Road and Parkside, should be phased with the construction of the northern sections if either part is to function as planned. Dual carriageways will be required on Gonville Place together with some improvement of the Hills Road and Mill Road junctions by 1968. The remaining sections Emmanuel Road, Parkside and Lensfield Road will require dual carriageways in the period 1974 to 1978.

19.26 The estimated cost of construction of the above road proposals are as follows:

Section	Construction	Construction Costs	Alternative	
			Construction	Construct- ion costs
Section 4 & 5 Emmanuel Road Parker Street and Parkside	Improve single carriageway with new alignment between Four Lamps and Parkside	£55,000	Improvement to existing Emmanuel Rd. & Parker St.	£45,000
	Dual above single carriageway	£35,000	New single carriageway Four Lamps to Gonville Place	£75,000
			Total Alternative costs - Sections 4 & 5	£120,000
Section 6 Gonville Place	Dualling existing single carriageway	£80,000		
Section 7 Lensfield Road	Dualling existing single carriageway	£25,000		
Total construction costs		£195,000		

19.27. The estimates for Gonville Place include for major improvements to the Hills Road and Mill Road junctions.

20. CENTRAL AREA

Policy of Control

20.01. The application of the basic policy of the Development Plan, that Cambridge shall remain predominantly a University Town, to the Central Area traffic problem will be to raise the standard of environment of the centre. This will be achieved by the reduction of the intensity of parking and traffic flow such that Cambridge becomes a pleasanter place in which the atmosphere of the historic centre may be enjoyed whatever the purpose of visit.

20.02. Parking in the Central Area will be limited by economic controls and enforced regulations such that the maximum use is made of facilities available (see section 13 above). The essence of the control of traffic on the streets will be the limitation of the north-south 'through' movements which have no business in the Central Area. These movements can only be excluded from the centre when spare capacity is available on alternative routes after the construction of Chesterton Bridge and the Northern Part of the Inner Relief Road.

20.03. The closure of Magdalene Bridge will immediately create an environment essentially for pedestrians along the line of Magdalene Street and Bridge Street. North-south river crossing movements will be removed entirely. There would, however, still be a number of north-south movements on the Central Area streets generated by traffic entering the Central Area from the south with destinations in Zones P1 and P2. The Central Area streets would also still be used for traffic entering from the north at Jesus Lane with destinations in Zones P3 and P4.

20.04. It is proposed that these movements should also be positively controlled. The system of one-way streets shown on Figure 30 is designed with the object of making these movements as difficult as possible. Should this system be unsuccessful, other more positive controls can be introduced such as either a system of loop one-way streets, whereby it would be possible to enter and leave the Central Area from the north or south but impossible to make a north to south movement, or by further physical closures of Sidney Street, Market Hill and Kings Parade. The latter would be preferable since a loop one-way system would tend to increase non-essential traffic on certain streets.

20.05. Distributive movements which will be prevented from using the Central Area streets will use the surrounding road system and in particular an inner ring formed by the Inner Relief River crossing, Jesus Lane, Emmanuel Road, Emmanuel Street, New Emmanuel Street and Pembroke Street. Pembroke Street cannot be radically improved and some traffic from the south will be distributed between the access

points to the centre on the Southern Sections of the Inner Relief Road. East Road acts as a distributor of traffic from the east to the southern half of the Central Area.

Ultimate Volumes

20.06. The ultimate number of movements entering Zones P1, P2, P3, P4 and P7 (the proposed Precinct area) will be about 2,290 vehicles per hour. This will be approximately equivalent to half the number of vehicles entering Zone Z in 1956. Since most of the distributive movements will have already taken place, and since the proposed entry points to the Precinct area have been designed so that all incoming traffic has to pass an off street car park before gaining access to the Central Area streets, very few of these movements will be made on the streets. The ultimate flows at the main entry points to the Central Area streets and to the car parks are estimated and compared with the flows in 1956 and 1960 in the following table.

<u>Streets</u>	Average Two-way Traffic flow - vehicles per hour		
	1956	1960	Ultimate
Kings Parade	471	531	310
St. Andrews Street	518	709	210
King Street (west)	162	200	180
Jesus Lane (west)	276	415	900
<u>Car Parks</u>			
Lion Yard	99	145*	1010
King Street	-	-	582
Park Street	-	-	582

* 1959

20.07. Because of the limitation of north-south movements, the average distance travelled by the traffic entering the Precinct area streets will be a quarter of the distance across the precinct and the average traffic flow on the streets will be half the volume shown above.

20.08. South of the Precinct area the ultimate traffic flows on the main streets are estimated as follows. Comparable volumes are also shown for 1956 and 1960.

Street	Average Two-way Traffic flow - vehicles per hour		
	1956	1960	Ultimate
Silver Street	310	331	720
Pembroke Street	253	319	670
Emmanuel Street	324	392	1200
Trumpington Street	601	667	850
Regent Street	559	687	580

Emmanuel Street

20.09. The junction of St. Andrews Street, Emmanuel Street and Pembroke Street will be a focal point for incoming traffic to the Central Area for several directions of approach and will be closely associated with the movements to the Lion Yard car park. An ultimate total of 2,055 vehicles per hour is expected to use this junction. A system of one-way streets using Downing Place, New Emmanuel Street and Downing Street is recommended with the object of eliminating all right and turns and providing free flowing access to the Lion Yard car park and the Central Area streets. This would involve some widening of the existing Downing Street and adjustment to the line of the proposed New Emmanuel Street. An underground access to Lion Yard car park from Emmanuel Street would be no real alternative to the proposed system. Such an access should be given serious consideration however in the overall design of the Lion Yard car park in view of the large number of movements associated with the high parking turnovers.

Linked Parking Signals

20.10. The proposed system of roads and parking in the Central Area would be very suitable for a system of linked parking signals which indicate at strategic points on the Inner Relief Road the whereabouts of vacant parking spaces. Automatic devices counting vehicles entering and leaving car parks could provide information on the number of off-street spaces available. Vehicle detectors buried in the road surface at each meter space would provide information on the number of unoccupied meter spaces. A parking signal system on these lines would greatly help to reduce traffic generated by vehicles searching for a space to park.

21. THE BACKS AND THE NEW WEST ROAD

21.01. The policy of the Development Plan is to maintain the traditional environment of the Backs and to avoid the creation of a traffic barrier between the Colleges in the old centre and the new University development, west of the river. After the provision of Chesterton Bridge and the Inner Relief Road, it is proposed to prohibit all commercial vehicles on Queens Road and to impose and enforce a speed limit of 20 m.p.h. on the remaining traffic.

21.02. The alternative routes and the above traffic regulations will reduce the existing traffic on Queens Road by 34%. The provision of a new western route comprising the Chaucer Road extension and river crossing, the New West Road joining Barton Road and Madingley Road, Storeys Way and an extension of Oxford Road to Histon Road would reduce existing traffic on the Backs by 5%. There may be some additional relief to the traffic on the Backs depending how much local traffic, i.e. that traffic associated with an origin or destination in Zone X, is attracted to the New West Road.

21.03. The New West Road would provide little relief to the Backs without the construction of the Chaucer Road extension which will provide a river crossing to the south of Fen Causeway. The construction of the Oxford Road extension in the north makes little difference to the relief afforded by the New West Road, but nevertheless provides a useful link to the new residential development in the Arbury Road area. Although there is little development along the general line of a western route described above, an allowance of 50% of the total traffic has been made for the local traffic generated by the facility.

21.04. The ultimate traffic on Queens Road and the New West Road is estimated as follows:

New West Road	550 vehicles per hour
Queens Road	990 vehicles per hour

21.05. The composition of the ultimate traffic is estimated as follows:

Movement	Queens Road	New West Road
Outer Zone/Outer Zone through traffic	22%	70%
Local through traffic associated with urban Zones W or Q	21%	4%
Local through traffic associated with central Zone P	29%	Nil
Stopping traffic in Zone X	28%	26%
Total	100%	100%

21.06. A single carriageway of modest proportions will provide sufficient capacity for the ultimate flows on Queens Road and the New West Road.

21.07. The estimated costs of construction of the new western route are as follows:

Section	Construction	Construction Costs
Chaucer Road extension	New single carriageway and river crossing	£200,000
New West Road from Barton Road to Madingley Road	A new single carriageway	£100,000
Storeys Way link from Madingley Road to Huntingdon Road	A new single carriageway or an extension of Storeys Way	£50,000
Oxford Road link from Huntingdon Road to Histon Road	Extension of existing single carriageway	£50,000
Total Construction Costs		£400,000

21.08. The proposed New West Road, whilst providing negligible relief to the City, would enable the intended plan for minimising the vehicular traffic on the Backs to be implemented and the scheme should be carried out as soon as practicable as the increasing traffic on Queens Road detracts from the desired environment of the Backs.

22. BROOKLANDS AVENUE LINK

22.01. The Brooklands Avenue Link, mentioned in the Report on the Development Plan, will be formed by a new road from the junction of Brooklands Avenue and Hills Road to Mill Road (Section 1) and from Mill Road to the junction of Newmarket Road and the Chesterton Bridge route (Section 2). This road would assume in part some of the functions of the Southern Part of the Inner Relief Route and East Road and in particular would become the main through route from the south to the east and to Chesterton Bridge. It would also provide an additional facility for the distribution of traffic associated with origins or destinations within Zone Q. After the construction of the Chesterton Bridge route and the Inner Relief Road, high volumes of traffic (cf. paragraph 19.20) may be expected on Lensfield Road, Gonville Place and East Road. The construction of the Brooklands Avenue link would reduce the ultimate traffic flows on these roads by the following amounts:

Lensfield Road	8%
Gonville Place	18%
East Road	36%

22.02. The redistributed ultimate flows are estimated as follows:

<u>Section</u>	<u>Average Ultimate Flows Vehicles per hour</u>
Lensfield Road	2150
Gonville Place	3170
East Road	1970
Brooklands Avenue link (Section 1)	1580
(Section 2)	1780

A 36 ft. wide single carriageway with some limitation of access and parking will provide sufficient capacity for the ultimate traffic on the Brooklands Avenue Link. There would still be a need to dual East Road, Lensfield Road and Gonville Place, although possibly at a later date than 1976-78.

22.03. The composition of the ultimate traffic on the Brooklands Avenue Link is estimated as follows:

Movement	Section 1	Section 2
Outer Zone/Outer Zone through traffic	11%	9%
Local through traffic associated with a destination in Zones W or X	6%	3%
Local traffic stopping in Zone Q	83%	88%
Total	100%	100%

22.04. The cost of construction of the Brooklands Avenue Link as a single carriageway is estimated at £200,000.

22.05. Although the relief afforded by the Brooklands Avenue Link to the Southern Part of the Inner Relief Road will be such that it would still be necessary to dual Lensfield Road and Gonville Place, it is considered that this alternative route would considerably ease the problems associated with the junctions between Gonville Place and Hills Road and Mill Road. Brooklands Avenue Link should therefore be given serious consideration after the completion of the Chesterton Bridge route, when the above junctions in their present form are likely to become seriously overloaded.

23. THE EASTERN BY-PASS

23.01. An eastern by-pass to Cambridge would be completed with the construction of Cam Causeway and the Newmarket Road, Coldhams Lane link.

23.02. After the completion of Chesterton Bridge, the construction of the Eastern By-pass would reduce the traffic on Victoria Avenue and the Inner Relief Routes by only 2%. The by-pass would also attract about 8% of the traffic initially attracted to Chesterton Bridge. The relief to the Central Area problem would be insignificant.

23.03. The ultimate flow on Cam Causeway is estimated at 370 vehicles per hour. Very little of the traffic which would use the Coldhams Lane link between Trumpington Road and Newmarket Road was intercepted by the 1956 Origin and Destination Survey. It is estimated that a total ultimate flow of 270 vehicles per hour would be attracted to the Coldhams Lane link from routes which at present pass through the Census Area of the O & D Survey. A single carriageway of modest proportions would provide sufficient capacity for these flows.

23.04. The cost of construction of the sections necessary to complete the Eastern By-pass are estimated as follows:

<u>Section</u>	<u>Construction Costs</u>
Coldhams Lane link	£40,000
Cam Causeway extension and new river crossing	£500,000

23.05. The above traffic flows do not warrant the high cost of completing the Eastern By-pass and, in particular, the cost of the additional river crossing. The construction of the link from Coldhams Lane to Newmarket Road, however, although not providing any significant relief to the Central Area problem, would undoubtedly be a useful facility in suburban Cambridge. The completion of the Eastern By-pass should not therefore be considered in any immediate programme of construction works.

24. NORTHERN BY-PASS

24.01. The proposed Northern By-pass to Cambridge will join Newmarket Road to Huntingdon Road and Maddingley Road.

24.02. Allowing for a potential increase of east-west through movements which do not stop in Cambridge to $4.7 \times$ the movements observed in 1956 and assuming

that all this traffic would be attracted by the new facility, a total of only 380 vehicles per hour would use the Northern By-pass.

24.03. The Northern By-pass will afford little relief to the traffic problem in Cambridge. Its provision would be in the interests of inter-regional movements rather than of benefit to the motorists having business in Cambridge.

25. PROGRAMME OF WORKS

25.01. A programme of works has been drawn up based on the following assumptions of growth rates:

- (i) 33% of the ultimate growth will occur by the year 1968.
- (ii) 67% of the ultimate growth will occur by the year 1980.
- (iii) 90% of the ultimate growth will occur by the year 2000.

25.02. In order to put the basic policies of the Development Plan into effect, the following major schemes are required "immediately":

- (i) Chesterton Bridge route.
- (ii) Inner Relief Road (Northern and Southern Sections).

25.03. No scheme can be constructed "immediately". The shortest time between initiating a scheme and the completion of construction is probably 5 years. The preparation of the scheme, procedures under the Highway Acts, land acquisition and detailed design, take a minimum of 3 years. Construction can usually be completed in two years. The main cost of the scheme therefore occurs in the last 2 years before completion.

25.04. As stated above, the first stages of the Chesterton Bridge scheme have already been started and the new bridge could be opened to traffic in 1966. In order to make full use of the new river crossing, the Milton Road link and the widening of East Road to at least a 36 foot single carriageway should be carried out in the same period.

25.05. If the Northern section of the Inner Relief Road is authorised this year (1962) completion cannot be expected before 1967. In order to complete the basic framework of the Inner Relief Route, the Parkside to Four Lamps link should be completed as a single carriageway to an improved alignment in the same time.

25.06. The Northern Part of the Inner Relief Road will act satisfactorily as a through route for east-west movements in addition to its other functions for only one year. By 1968 the grade separated junctions at Four Lamps and Mitchams Corner should be completed. The dual carriageways on Gonville Place and improvements to

the junctions at Hills Road and Mill Road should also be completed by 1968.

25.07. With this programme in the four year period 1964-68, the estimated total expenditure on construction, excluding land acquisition and re-housing, is about £2 million, i.e. an average expenditure of £500,000 per annum.

25.08. This programme of major works will catch up the back-log of work necessary to relieve the existing traffic congestion.

25.09. A second programme will be necessary in the period 1974-78. This programme should include the following schemes:

- (a) Dualling Victoria Avenue and construction of grade separated junction at Chesterton Lane.
- (b) Dualling of East Road.
- (c) Dualling of Parkside and Emmanuel Road.
- (d) Dualling of Lensfield Road.

The cost of these works excluding land acquisition is estimated at £500,000, i.e. an average expenditure of £125,000 per annum.

25.10. Depending on the stage at which further controls limiting distributive movements on the Central Area streets are introduced (paragraph 20.04), the need for parts (a), (c) and (d) of the above second stage programme could arise before 1974. If complete control of Central Area movements is to be enforced at the earliest opportunity, i.e. after the provision of the northern section of the Inner Relief Road, the second stage programme should run consecutively with the first and should generally be completed in the period 1968-1972.

25.11. The Eastern By-pass, particularly the river crossing, is not sufficiently important to Cambridge to justify its construction before the turn of the century.

25.12. The New West Road will need to be constructed before the speed and loading restrictions can be fully applied to the Backs. The Chaucer Road extension should be constructed at the same time. This construction could reasonably be carried out in a four year period between 1968 and 1974. The total cost of construction would be £400,000, i.e. average expenditure of £100,000 per annum.

25.13. The above programme is summarised diagrammatically on Figure 33.

W.L. Waide,
County Planning Officer,
Cambridge.

A. Goldstein (Partner),
R. Travers Morgan and Partners,
Consulting Engineers, London.

AVERAGE TRAFFIC VOLUMES AND VEHICLE MILES

CENTRAL AREA

	Length Miles	Average Hourly Flows (Vehicles) 8.30 a.m. - 6.0 p.m. Weekday in May or June (in term - except for 1948)				
		1948	1951	1956	1958	1960
King's Parade	0.24	(367) 327	(474) 422	(529) 471	(487) 433	(598) 531
Trinity Street	0.21	(319) 316	(432) 428	(476) 471	(524) 519	(577) 565
Market Street	0.13	316	379	337	387	467
Sidney Street	0.18	266	333	342	515	502
St. Andrews Street	0.16	482	565	518	544	709
Regent Street	0.38	(478) 444	569	559	655	687
Downing Street	0.27	188	224	249	272	319
Trumpington Street	0.36	365 * 365	(536) 477	(601) 535	(602) 536	(667) 593
Emmanuel Street	0.14	217 *	260	324	299	392
Jesus Lane	0.35	206 *	260 *	276	360	415 *
Magdalene Street	0.23	392 *	497	590 †	676	768
Silver Street	0.26	192 *	259 *	279 †	315	331
Vehicle Miles		906	1154	1230	1371	1556
Vehicle Miles 1948 = 100		100	128	136	151	172

INNER RING

		1948	1951	1956	1958	1960
Parkside	0.27	369	441	(524) 488	652	689
Emmanuel Road	0.21	371	444	516	675	718
Victoria Avenue	0.45	637	826	1047	1173	1337
Lensfield Road	0.24	368	489	544	555	699
Queens Road	0.85	269	413	467	576	689
Gonville Place	0.27	467 *	618 *	687	744	874
Chesterton Lane	0.53	301 *	389 *	494	554	657
Fen Causeway	0.41	423 *	562 *	574	624	804
Vehicle Miles		1240	1656	1921	2219	2606
Vehicle Miles 1948 = 100		100	134	155	179	210

Note : Figures in brackets are Saturday Counts

* Flows interpolated from results of counts in other years

† Flows adjusted from 4 hour counts (2 p.m. - 6 p.m.) taken during origin and destination survey

TRAFFIC GROWTH

		1948	1951	1956	1958	1959	1960
CENTRAL AREA	Av. Hour - Veh. Miles	906	1154	1230	1371		1556
	1948 = 100	100	128	136	151		172
	Compound Increase p. a. %		8.6	1.2	5.5		6.7
INNER RING	Av. Hour - Veh. Miles	1240	1656	1921	2219		2606
	1948 = 100	100	134	155	179		210
	Compound Increase p. a. %		10.3	2.8	7.5		8.3
CITY BOUNDARY	Total Average hourly flow - vehicles	1438	1751	2485	2616	2812	
	1948 = 100	100	122	173	182	196	
	Compound Increase p. a. %		6.8	7.2	2.6	7.5	
NATIONAL	1948 = 100	100	144	192	220	246	256
	Compound Increase p. a. %		12.5	5.9	7.1		10.0

1956 CENSUS " N x N " TABULATION

		TO AND FROM													Z
		9 Huntingdon Road	10 Madingley Road	11 Barton Road	12 Trumpington Road	13 Hills Road	14 Mill Road	15 Newmarket Road	16 Chesterton Road	17 Milton Road	18 Histon Road	Urban Zone W.	Urban Zone X	Urban Zone Y.	
TO AND FROM	10 Madingley Road	26		3	76	42	5	152	5	28	11	127	272	329	117
	11 Barton Road	6	3	-	20	36	12	39	10	24	6	26	232	204	87
	12 Trumpington Road	253	76	24	-	53	10	83	54	211	58	266	309	1531	464
	13 Hills Road	113	42	36	69	-	19	34	22	65	24	171	112	1930	300
	14 Mill Road	22	5	12	10	19	-	5	31	3	7	136	33	976	123
	15 Newmarket Road	248	168	39	83	34	41	-	114	107	47	572	61	1794	372
	16 Chesterton Road	30	16	10	54	22	37	114	-	14	2	450	42	351	117
	17 Milton Road	41	48	24	211	60	31	107	14	-	4	841	53	500	145
	18 Histon Road	38	11	6	58	24	7	47	2	4	-	287	9	179	100
	Urban Zone W.	779	127	26	266	171	136	572	450	841	287	-	353	1906	983
	Urban Zone X.	15	272	232	309	112	33	61	42	53	9	353	-	1120	378
	Urban Zone Y	644	329	204	1531	1930	976	1794	351	500	179	1906	1120	-	2878
	Urban Zone Z.	252	117	87	464	358	123	372	117	145	100	983	378	2878	-

X-River $\frac{1108}{3432} = 32\%$

Non-City $\frac{592}{3432} = 17\%$

ROUTES OF NORTH-SOUTH RIVER CROSSING JOURNEYS

		FROM AND TO	VIA									TOTAL MOVEMENT	
			SILVER STREET		FEN CAUSEWAY		VICTORIA AVENUE	MAGDALENE BRIDGE					
			DIRECT	19 Northampton Street	DIRECT	19 Northampton Street		2 Trumpington Street	3 St. Andrew's Street	4 King Street	5 Jesus Lane		20 Corn Exchange Street
TO AND FROM	12 Trumpington Road	9 Huntingdon Road	15	1	178	21	2	32	4				253
		16 Chesterton Road		3		17	25	9					54
		17 Milton Road		6	7	132	32	30	3		1		211
		18 Histon Road	1	1	44	7	2	3					58
		Urban Zone W.		11		152	35	61	7				266
	13 Hills Road	9 Huntingdon Road	3		55	11	4	17	22		1		113
		16 Chesterton Road				1	17	2	2				22
		17 Milton Road				9	44	3	4				60
		18 Histon Road			9	3	10	1	1				24
		Urban Zone W.		6		32	76	32	25				171
	14 Mill Road	9 Huntingdon Road			1		19		1		1		22
		16 Chesterton Road					37						37
		17 Milton Road					30		1				31
		18 Histon Road					7						7
		Urban Zone W.		2		2	113	8	9		2		136
	15 Newmarket Road	9 Huntingdon Road	1		2		220	1	2	1	21		248
		16 Chesterton Road					112				2		114
		17 Milton Road					105		1		1		107
		18 Histon Road					45				2		47
		Urban Zone W.				1	489	2	3	1	76		572
	Urban Zone Y	9 Huntingdon Road	56	6	99	18	183	128	114	3	36	1	644
		16 Chesterton Road		14		12	315	6	2	1	1		351
		17 Milton Road		15		40	407	17	15	2		1	500
		18 Histon Road	16	4	11	4	102	11	27		3	1	179
		Urban Zone W.		83		120	1263	167	206	4	57	6	1906

Table 4 (5.07)

ROUTES OF EAST-WEST RIVER CROSSING JOURNEYS

TO AND FROM		FROM AND TO	VIA							TOTAL MOVEMENT	
			6 Silver Street	7 Fen Causeway	19 Northampton Street & 8 Victoria Avenue	19 Northampton Street and 1 Magdalene Bridge					
						2 Trumpington St.	3 St. Andrews St.	4 King Street	5 Jesus Lane		20 Corn Exchange Street.
	10 Madingley Road	12 Trumpington Road	3	64	2	6			1		76
		13 Hills Road	3	30	2	1	6				42
		14 Mill Road		1	4						5
		15 Newmarket Road		2	152		1	1	12		168
		Urban Zone Y.	105	62	90	11	48	2	11		329
	11 Barton Road	12 Trumpington Road		24							24
		13 Hills Road		36							36
		14 Mill Road		12							12
		15 Newmarket Road	1	36	1			1			39
		Urban Zone Y.	38	156	5		2	2	1		204
	Urban Zone X	12 Trumpington Road	34	272	1	2					309
		13 Hills Road	16	92	4						112
		14 Mill Road	5	22	4	1	1				33
		15 Newmarket Road	2	26	30		1		2		61
		Urban Zone Y.	441	615	38	9	12		5		1120

Table 5 (3. 07)

ROUTES OF NON RIVER CROSSING JOURNEYS

TO AND FROM			VIA														TOTAL MOVEMENT	
			FROM AND TO		DIRECT		19 via Northampton Street		SILVER STREET			FEN CAUSEWAY			Trumpington Street			3 St. Andrews Street.
NORTH OF RIVER CAM			10, Madingley Road		9 Huntingdon Road	23	3											26
					16 Chesterton Road		16											
Urban Zone X			11, Barton Road <td>17 Milton Road</td> <td>2</td> <td>46</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>48</td>		17 Milton Road	2	46											48
					18 Histon Road	7	4											
Urban Zone Y			Urban Zone W.				124			2				1				127
SOUTH OF RIVER CAM			Urban Zone X		9 Huntingdon Road	6												6
					16 Chesterton Road		9						1					10
Urban Zone Y			Urban Zone W.		17 Milton Road		21	1						2				24
					18 Histon Road	6												6
Urban Zone Z			Urban Zone W.				14		1	1	2	6	2					26
Urban Zone A			Urban Zone W.		9 Huntingdon Road		5	4	1		1	2	1	1				15
					16 Chesterton Road		41	1										42
Urban Zone B			Urban Zone W.		17 Milton Road		49	1			1			2				53
					18 Histon Road		8	1										9
Urban Zone C			Urban Zone W.				341	7	1	1	2							353
Urban Zone D			Urban Zone W.		9 Trumpington Road to and from 15 Newmarket Road	77									1	5		83
Urban Zone E			Urban Zone W.		12 Trumpington Road to and from Urban Zone Y	1514									1	14	2	1531
Urban Zone F			Urban Zone W.		15 Newmarket Road to and from Urban Zone Y.	1781									1	12		1794

ROUTES TO CENTRAL ZONE Z

		ROUTE	TO AND FROM												
			9 Huntingdon Road	10 Madingley Road	11 Barton Road	12 Trumpington Road	13 Hills Road	14 Mill Road	15 Newmarket Road	16 Chesterton Road	17 Milton Road	18 Histon Road	Urban Zone W.	Urban Zone X	Urban Zone Y.
ENTRY/EXIT POINT	1 Magdalene Street	Direct	210	85*	11*					42	50	70	675	90*	
		6 Silver Street				1*									1*
		7 Fen Causeway				1*									1*
		8 Victoria Avenue							9						3
	2 Trumpington Street	Direct				375	116	8	21						874
		6 Silver Street	12*	20	44	2				1*		2*	19*	198	
		7 Fen Causeway	3*	2	18					1*	1*	1*		38	
		8 Victoria Avenue								2	2		4	2*	
	3 St. Andrews Street	Direct				47	201	56	54						1140
		6 Silver Street	1*	1	2									9	
		7 Fen Causeway	2*	1	7						1*			8	
		8 Victoria Avenue	4		1						13	27	6	37	1*
	4 King Street	Direct				24	15	27	62						297
		6 Silver Street												1	
		7 Fen Causeway			1										
		8 Victoria Avenue	8	4*							21	14	11	100	18*
	5 Jesus Lane	Direct				11	23	27	222						454
		6 Silver Street													
		7 Fen Causeway		1	3									1	
		8 Victoria Avenue	10	1*							35	50	9	144	9*
	20 Corn Exchange Street	Direct				3	3	5	4						108
		6 Silver Street	2*	2										3	
		7 Fen Causeway											1		
		8 Victoria Avenue									2		1	9*	
TOTAL MOVEMENT			252	117	87	464	358	123	372	117	145	100	983	378	2878

* via Northampton Street

JOURNEY TIME SURVEY

Wednesday 28th February and Thursday 1st March, 1962 - (in term)

Road	From	To	Length	Number of runs	Average Journey Time	Average Delay Time	Average Speed
			Miles		Secs	Secs	m.p.h.
Barton Road	Newnham Road	King's Sports Ground	0.76	14	93	-	29.4
Bridge Street Magdalene Street	Northampton Street	Round Church	0.23	36	62	7	13.4
Brooklands Avenue	Trumpington Road	Hills Road	0.42	9	69	7	21.9
Brooks Road	Mill Road	Coldhams Lane	0.33	12	49	1	24.2
Cam Causeway	Milton Road	The End	0.47	6	68	-	24.9
Castle Street	Northampton Street	Victoria Road	0.29	12	58	6	18.0
Chesterton Road	Haig Road	Mitchams Corner	0.44	12	68	-	23.3
Chesterton Lane Chesterton Road	Magdalene Street	Mitchams Corner	0.50	12	86	5	20.9
Downing Street Pembroke Street	St. Andrews Street	Trumpington Street	0.27	12	88	10	11.1
East Road	Park Side	Newmarket Road	0.52	12	112	7	16.7
Emmanuel Road	Four Lamps	Parker Street	0.22	12	58	4	13.7
Emmanuel Street	Emmanuel Road	St. Andrews Street	0.14	24	40	4	12.6
Fen Causeway	Trumpington Street	Newnham Road	0.43	24	71	5	21.8
Gonville Place	Hyde Park Corner	Park Side	0.28	12	51	1	19.8
Hills Road	Hyde Park Corner	Brooklands Avenue	0.56	12	104	-	19.4
Hills Road	Brooklands Avenue	Long Road	1.01	12	148	7	24.6
Histon Road	Victoria Road	Gilbert Road	0.57	16	83	1	24.7
Hobson Street King Street	St. Andrews Street	Four Lamps	0.38	12	102	9	13.4
Huntingdon Road	Storeys Way	Victoria Road	0.47	12	57	-	29.7
Jesus Lane	Four Lamps	Marshalls Garage	0.26	12	59	9	15.9
Jesus Lane	Marshalls Garage	Sidney Street	0.09	12	30	3	10.8
Kings Parade	St. Mary's Street	Pembroke Street	0.24	12	60	6	14.4
Lenafield Road	Trumpington Street	Hyde Park Corner	0.25	12	75	22	12.0
Long Road	Hills Road	Trumpington Road	1.16	12	141	5	29.6
Madingley Road	Hedgerley Close	Queens Road	0.64	12	92	-	25.1
Market Street	Trinity Street	Sidney Street	0.13	24	56	8	8.4
Mill Road	Gonville Place	Railway Bridge	0.50	12	127	10	14.2
Mill Road	Railway Bridge	Brooks Road	0.69	12	131	-	19.0
Milton Road	Green End	Hawthorn Way	0.79	12	110	4	25.9
Milton Road	Hawthorn Way	Mitchams Corner	0.47	12	70	-	24.2

Table 8 (1.06)

JOURNEY TIME SURVEY (continued)

Road	From	To	Length Miles	Number of runs	Average Journey Time Secs	Average Delay Time Secs	Average Speed m.p.h.
Perne Road Mowbray Road Queen Edith's Way	Mill Road	Hills Road	1.48	12	193	1	27.6
Newmarket Road	Ring Road	East Road	1.17	14	178	4	23.7
Newmarket Road	East Road	Four Lamps	0.47	12	77	-	22.0
Newnham Road	Silver Street	Fen Causeway	0.19	12	41	1	16.8
Newnham Road	Fen Causeway	Barton Road	0.15	14	26	-	20.8
Northampton Street	Magdalene Street	Queens Road	0.15	12	41	6	13.2
Park Side Parker Street	Gonville Place	Emmanuel Road	0.28	12	59	3	17.1
Queens Road	Medingley Road	Silver Street	0.67	12	87	2	27.7
Regent Street	Hyde Park Corner	Downing Street	0.38	12	79	3	17.3
Ring Road (North)	Newmarket Road	Ditton Walk	0.34	12	58	-	21.1
Ring Road (South)	Newmarket Road	The End	0.35	12	55	-	22.9
St. Andrews Street	Hobson Street	Emmanuel Street	0.12	24	40	6	10.8
St. Andrews Street	Emmanuel Street	Downing Street	0.04	24	16	2	9.0
St. John's Street Trinity Street	Round Church	St. Mary's Street	0.21	23 *	57	2	13.3
Shelly Row	Victoria Road	Queen's Road	0.34	12	75	2	16.3
Sidney Street	Market Street	Jesus Lane	0.12	12	32	-	13.5
Sidney Street	Jesus Lane	Round Church	0.06	18	20	-	10.8
Sidney Street	Market Street	Hobson Street	0.08	18	22	1	13.1
Silver Street	Trumpington Street	Queen's Road	0.26	12	73	9	12.8
Trumpington Street	Fen Causeway Lensfield Road	Silver Street Pembroke Street	0.36	12	70	11	18.5
Trumpington Street	Brooklands Avenue	Fen Causeway Lensfield Road	0.45	24	65	2	24.9
Trumpington Road	Long Road	Brooklands Avenue	0.83	12	93	-	32.1
Victoria Avenue	Mitchams Corner	Four Lamps	0.50	24	91	9	19.8
Victoria Road	Mitchams Corner	Huntingdon Road	0.66	12	111	3	21.4

* One Journey discarded due to a delay of 6½ Minutes

THURSDAY PARKING - MID AFTERNOON PEAK ACCUMULATIONS

YEAR	SURVEY CARRIED OUT BY	AREA 1			AREA 1 & 2			AREA 1, 2 & 3		
		Streets	Car Parks	Total	Streets	Car Parks	Total	Streets	Car Parks	Total
1956 July	County Planning Dept.	303	154	457	586	294	880	749	297	1046
1959 July	County Planning Dept.	377	240	617	713	386	1099	958	461	1419
1961 Oct.	County Planning Dept.	393	188	581	802	278	1080	1103	497	1600
1962 Feb.	W.S. Atkins.	435	277	712	925	386	1311	1261	533	1794
1962 March	City Police.				1003 ⁽¹⁾	427 ⁽¹⁾	1430 ⁽¹⁾			
1962 April	W.S. Atkins.	419	178	597	812	303	1115	1099	427	1526

(1) Main Streets only: evening count 8 p.m. - 9 p.m.

FRIDAY PARKING - MID AFTERNOON PEAK ACCUMULATIONS

YEAR	SURVEY CARRIED OUT BY	AREA 1			AREA 1 & 2			AREA 1, 2 & 3		
		Streets	Car Parks	Total	Streets	Car Parks	Total	Streets	Car Parks	Total
1949 Jan.	County Planning Dept.	-	-	-	487	212	699	-	-	-
1956 July	County Planning Dept.	484	241	725	886	387	1275	1046	387	1433
1959 July	County Planning Dept.	481	285	766	975	514	1489	1264	592	1856
1961 March	City Police				699 ⁽¹⁾					
1961 Oct.	County Planning Dept.	473	285	758	1111	473	1584	1504	671	2175
1962 Feb.	W.S. Atkins.	530	287	817	1167	505	1672	1505	653	2158
1962 March	City Police				859 ⁽²⁾	373 ⁽²⁾	1232 ⁽²⁾			
1962 April	W.S. Atkins	546	270	816	1138	474	1612	1525	604	2129

(1) "Composite" weekday excluding Thursday, main streets only.

(2) Main Streets only - evening count 8 p.m. - 9 p.m.

SATURDAY PARKING - MID AFTERNOON PEAK ACCUMULATIONS

YEAR	SURVEY CARRIED OUT BY	AREA 1			AREA 1 & 2			AREA 1, 2 & 3		
		Streets	Car Parks	Total	Streets	Car Parks	Total	Streets	Car Parks	Total
1949 Jan.	County Planning Dept				579	464	1043			
1956 July	" " "	525	200	725	1075	467	1542	1384	469	1853
1959 July	" " "	447	195	642	958	493	1451	1363	613	1976
1961 Oct.	" " "	526	239	765	1238	549	1787	1749	918	2667
1961 Dec.	City Police				1291 ⁽¹⁾					
1962 Jan.	" "				1225 ⁽¹⁾					
1962 Feb.	W.S. Atkins	483	252	735	1151	552	1703	1604	700	2304
1962 April	" "	474	261	735	1213	556	1769	1674	814	2488

(1) A few side streets not covered.

GROWTH OF MID AFTERNOON PARKING ACCUMULATIONS 1956 = 100

YEAR	AREA 1			AREA 1 & 2			AREA 1 & 2 & 3		
	Thurs.	Fri.	Sat.	Thurs.	Fri.	Sat.	Thurs.	Fri.	Sat.
1949 Jan.					55	68			
1956 July = 100	100	100	100	100	100	100	100	100	100
1959 July	135	106	89	125	117	96	136	129	106
1961 October	127	105	105	123	124	116	153	152	144
1962 Feb.	156	112	101	149	131	111			
1962 April	131	112	102	127	127	115	146	149	134

Table 13 (7.13)

STREETS	CARS ARRIVING BETWEEN 80-100										CARS ARRIVING BETWEEN 100-200										CARS ARRIVING BETWEEN 200-400										CARS ARRIVING BETWEEN 400-600										NOTES
	STAYING FOR A PERIOD OF										STAYING FOR A PERIOD OF										STAYING FOR A PERIOD OF										STAYING FOR A PERIOD OF										
	UNDER 1 HOUR	1 TO 2 HOURS	2 TO 4 HOURS	4 TO 6 HOURS	6 TO 8 HOURS	ALL DAY	UNDER 1 HOUR	1 TO 2 HOURS	2 TO 4 HOURS	4 TO 6 HOURS	6 TO 8 HOURS	ALL DAY	UNDER 1 HOUR	1 TO 2 HOURS	2 TO 4 HOURS	4 TO 6 HOURS	6 TO 8 HOURS	ALL DAY	UNDER 1 HOUR	1 TO 2 HOURS	2 TO 4 HOURS	4 TO 6 HOURS	6 TO 8 HOURS	ALL DAY	UNDER 1 HOUR	1 TO 2 HOURS	2 TO 4 HOURS	4 TO 6 HOURS	6 TO 8 HOURS	ALL DAY											
ALEXANDER STREET	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1. CARS WITH 1 HOUR OF 10 MINUTE STAYING IN STREETS ARE BEING RECORDED IN THIS COLUMN. 2. CARS WITH 1 HOUR OF 10 MINUTE STAYING IN STREETS ARE BEING RECORDED IN THIS COLUMN. 3. CARS WITH 1 HOUR OF 10 MINUTE STAYING IN STREETS ARE BEING RECORDED IN THIS COLUMN.									
BENTLEY STREET	11	5	1	-	4	-	1	2	1	-	-	17	5	4	-	1	-	-	-	-	-	-	-	-	25	10	2	5	1	-	-										
BUTLPH LANE	6	5	2	3	3	5	5	5	2	7	5	10	1	2	2	-	1	5	2	-	5	5	1	2	6	7	5	3	5	5	14		-								
DEAN STREET	32	40	5	11	2	6	1	1	-	-	-	47	50	5	14	10	5	-	1	-	2	45	65	7	6	4	6	3	-	55	51		5								
DEAN STREET	5	5	4	3	1	5	-	-	-	-	-	25	21	5	3	-	-	1	-	-	1	20	15	5	6	1	-	1	1	20	17		4								
DEAN STREET	-	5	-	1	-	2	-	-	-	-	-	-	10	-	5	-	-	-	-	-	-	5	6	-	1	-	1	-	-	-	-		2								
DEAN STREET	24	17	4	4	1	1	-	2	1	2	25	35	4	5	-	-	-	1	-	-	10	2	3	4	1	1	-	-	21	26	2										
DEAN STREET	13	24	4	5	6	4	1	-	2	1	27	37	6	5	4	5	-	-	-	1	35	32	10	5	1	5	1	-	35	35	4										
DEAN STREET	19	17	2	3	12	12	-	1	5	6	25	24	1	5	-	-	-	1	-	4	25	34	4	4	3	2	-	-	25	22	4										
DEAN STREET	42	36	6	11	2	5	5	2	5	5	45	44	6	7	4	1	2	-	1	2	60	45	5	5	2	5	1	2	57	65	10										
DEAN STREET	46	36	3	6	2	5	-	1	1	1	45	54	5	7	5	1	-	-	-	-	34	50	10	7	1	2	5	1	37	51	5										
DEAN STREET	15	15	1	4	1	4	-	3	1	4	30	5	5	5	1	1	1	-	1	-	15	17	4	4	1	3	-	-	21	15	4										
DEAN STREET	42	54	5	14	-	5	-	-	-	-	52	50	6	7	1	4	-	2	-	-	45	60	6	4	1	5	-	-	44	51	5										
DEAN STREET	27	17	-	-	-	-	-	-	-	-	21	12	-	-	-	-	-	-	-	-	5	5	1	-	-	-	-	16	5	-	-	5									
DEAN STREET	26	30	4	5	5	3	1	-	1	-	42	35	5	5	2	1	-	-	-	-	31	35	5	5	-	-	-	1	55	35	7										
DEAN STREET	15	5	2	-	2	-	1	-	-	-	17	22	5	6	5	2	-	1	2	-	14	15	10	1	5	1	5	2	57	15	7										
DEAN STREET	56	26	1	2	-	-	-	-	-	-	60	25	-	-	-	-	-	-	-	-	20	15	1	-	-	-	-	16	23	1	-	20									
DEAN STREET	7	10	1	5	4	2	5	1	2	-	5	5	-	5	3	2	1	1	-	-	12	14	11	5	2	-	6	1	11	12	4										
DEAN STREET	1	12	1	5	5	5	4	3	7	11	11	10	-	5	2	5	-	2	-	2	6	11	1	1	-	1	2	1	10	12	5										
DEAN STREET	4	15	4	1	-	1	2	1	5	2	14	5	3	1	2	5	1	1	-	2	7	5	1	1	-	1	1	1	5	7	2										
DEAN STREET	44	34	2	3	-	-	-	-	-	1	65	36	7	5	-	2	-	-	1	-	55	50	6	4	-	1	-	-	70	47	5										
DEAN STREET	27	44	5	5	3	2	1	1	2	2	54	40	4	11	2	-	-	1	-	-	30	45	5	11	2	1	2	1	42	44	11										
DEAN STREET	4	4	1	-	-	-	-	-	-	-	5	-	-	-	-	-	-	-	-	-	4	5	-	-	-	-	-	-	5	4	-										
DEAN STREET	56	45	5	5	5	6	1	1	-	-	60	50	5	5	3	2	1	1	3	-	61	54	5	4	1	2	1	2	71	42	7										
DEAN STREET	5	5	1	2	2	2	1	-	1	5	6	5	1	1	1	-	-	-	-	-	4	2	2	-	-	2	-	-	12	2	1										
DEAN STREET	21	23	2	7	1	1	-	-	-	-	44	40	5	6	5	1	2	-	-	-	55	41	7	5	6	6	1	3	35	30	11										
TOTAL ON STREETS	525	579	122	109	57	75	26	25	30	47	755	721	95	106	52	35	10	16	10	15	610	705	115	55	34	45	26	15	725	727	110										
CAR PARKS																																									
MARKET HILL	13	14	16	6	15	15	4	5	15	16	10	12	4	7	7	4	8	3	2	5	15	6	4	4	5	4	4	3	13	5	11										
LION YARD	15	56	15	15	51	72	5	15	35	62	25	57	41	35	22	23	15	15	25	17	25	51	5	14	20	42	26	26	14	55	25										
TOTAL IN CAR PARKS	28	72	25	24	66	87	15	27	50	78	35	65	45	40	25	27	21	22	50	22	40	57	13	15	28	46	30	25	27	63	35										
TOTAL	553	651	151	132	123	160	35	52	80	125	773	790	144	146	77	66	31	38	40	37	650	762	131	107	62	95	56	45	756	750	145										
CAMBRIDGE TRAFFIC PLAN.																		AREA I - PARKING VOLUMES																		W. L. WARD COUNTY PLANNING OFFICE CAMBRIDGE, MASS.		S. JAMES WARD & PRO. COUNTY ENGINEERS LONDON			
DISTRIBUTION DURING PERIOD 80-10																																									

STREETS.	CARS ARRIVING BETWEEN 8:00-10:00										CARS ARRIVING BETWEEN 10:00-12:00										CARS ARRIVING BETWEEN 12:00-2:00										CARS ARRIVING BETWEEN 2:00-4:00										CARS ARRIVING 4:00-6:00										NOTES
	STAYING FOR A PERIOD OF										STAYING FOR A PERIOD OF										STAYING FOR A PERIOD OF										STAYING FOR A PERIOD OF										STAYING FOR A PERIOD OF										
	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963	1954	1955	1956	1957	1958	1959	1960	1961	1962	1963											
BOLTON PLACE	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	9	21	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2											
CLARENCE STREET	-	8	-	-	-	-	-	-	-	-	-	18	-	-	-	-	-	-	-	-	-	14	-	-	-	-	-	-	-	-	8	-	2	-	5	-	10	-	4												
BRUNNEN PLACE	3	7	4	2	4	6	4	6	6	2	2	7	5	2	2	1	-	-	-	-	8	6	2	-	-	1	2	4	5	9	5	2	10	8	4	4	5	2													
BRUNNEN STREET	2	14	3	-	-	1	1	2	-	1	7	16	1	2	-	1	-	-	-	-	11	19	4	-	-	-	-	1	6	17	5	1	-	1	7	12	4	-													
BRUNNEN STREET	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-													
BRUNNEN ROAD	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-													
BRUNNEN ROAD	17	17	1	5	-	5	2	2	1	1	28	34	4	19	4	4	-	-	2	-	14	22	6	4	5	5	5	2	51	34	9	7	5	2	55	28	8	7													
BRUNNEN STREET	-	-	-	-	-	-	-	-	-	-	-	4	-	2	-	-	-	-	-	-	-	4	-	-	-	-	-	-	-	-	-	-	-	-	-	5	-	-													
BRUNNEN STREET	4	15	-	2	-	3	1	2	-	2	1	4	1	2	-	-	1	1	-	-	6	7	1	-	-	1	-	-	6	10	1	2	-	4	2	4	-	1													
BRUNNEN STREET	6	6	5	4	-	7	-	2	4	6	9	15	6	5	2	5	-	-	1	-	6	14	5	3	5	4	1	1	11	9	4	10	9	5	4	12	2	4													
BRUNNEN PLACE	3	4	1	1	1	-	5	2	-	2	12	5	-	-	-	-	-	1	-	-	11	8	1	1	-	1	1	-	4	6	-	-	1	-	5	8	-	2													
BRUNNEN PLACE	10	11	6	5	11	9	10	15	17	22	30	25	6	5	5	4	-	1	2	-	19	25	-	6	4	6	1	5	14	17	5	12	-	18	17	22	5	11													
BRUNNEN PLACE	5	5	1	3	7	2	6	5	4	7	5	8	1	2	2	1	-	1	-	-	11	9	1	2	2	1	-	-	6	2	5	2	5	3	4	8	2	-													
BRUNNEN STREET	23	31	1	7	3	4	-	2	1	4	6	32	5	8	1	3	-	1	-	1	26	31	4	5	1	2	1	1	34	17	2	4	2	7	26	17	1	6													
BRUNNEN STREET	7	1	-	-	2	-	-	-	-	-	18	12	2	-	-	-	-	-	-	-	2	5	4	1	-	-	-	2	15	1	4	-	6	-	14	5	2	1													
BRUNNEN STREET	-	-	-	-	-	1	-	1	-	-	-	-	-	-	-	-	-	-	-	-	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-														
BRUNNEN PLACE	1	5	1	1	5	7	-	-	6	5	5	6	2	2	2	-	-	1	-	2	5	5	1	5	1	-	-	2	5	8	5	3	8	8	5	4	-	1													
BRUNNEN STREET	14	15	5	4	5	3	1	3	4	6	13	6	1	2	4	1	1	2	-	2	14	15	2	1	-	1	2	-	5	12	2	3	2	6	12	8	5	9													
BRUNNEN STREET	26	36	4	1	4	9	1	5	-	5	97	26	2	1	4	5	1	-	-	-	36	166	5	11	1	4	-	-	126	180	7	11	6	6	146	80	5	7													
BRUNNEN STREET	57	44	5	1	2	3	-	-	-	-	29	56	5	3	-	-	-	-	-	-	54	60	1	2	-	-	-	-	54	84	6	10	-	-	44	31	2	4													
BRUNNEN STREET	-	2	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-	-	-	2	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-													
BRUNNEN STREET	5	5	1	-	-	1	-	-	1	1	7	8	4	5	3	1	-	-	-	1	7	6	2	1	2	-	-	-	6	6	5	1	1	1	8	1	2	-													
BRUNNEN STREET	-	7	1	2	5	5	-	4	4	9	4	3	1	3	2	-	-	1	-	1	3	4	-	-	1	-	3	1	2	1	-	4	5	4	2	1	-														
BRUNNEN STREET	6	8	1	1	2	4	5	4	6	6	9	2	5	1	5	3	1	1	5	-	6	4	2	1	-	1	1	6	5	2	1	4	3	5	10	5	5														
BRUNNEN STREET	42	44	7	10	5	10	-	5	6	4	67	86	19	13	7	8	3	1	1	1	39	52	6	5	3	5	5	1	75	74	21	6	16	7	39	53	9	6													
TOTAL ON STREETS	264	336	45	51	54	79	32	55	60	79	380	453	66	76	41	34	7	11	11	8	350	443	43	46	21	32	17	21	402	415	86	80	77	80	571	367	52	70													
CAR PARK	56	26	9	15	25	25	7	14	56	71	11	20	15	22	23	31	10	15	-	15	8	46	23	24	16	19	28	21	16	52	27	36	40	46	47	54	53	25													
TOTAL	320	364	54	64	77	104	39	69	116	150	390	473	81	98	64	65	17	26	11	23	358	491	68	72	39	51	45	42	418	447	115	116	117	120	618	401	65	95													

CAMBRIDGE TRAFFIC
PLAN.

AREA 2 - PARKING VOLUMES
DISTRIBUTION DURING PERIOD 8:00AM-6:00PM.

W. L. WARD
COUNTY PLANNING OFFICER,
CAMBRIDGE

A. J. WARD
COUNTY PLANNING OFFICER,
CAMBRIDGE

DRAWING No 1534/EZ

Table 15 (7.13)

STREETS	CARS ARRIVING BETWEEN 80-100						CARS ARRIVING BETWEEN 100-120						CARS ARRIVING BETWEEN 120-140						CARS ARRIVING BETWEEN 140-160						CARS ARRIVING 160-180						NOTES
	STAYING FOR A PERIOD OF						STAYING FOR A PERIOD OF						STAYING FOR A PERIOD OF						STAYING FOR A PERIOD OF						STAYING FOR A PERIOD OF						
	1-5 MIN	5-10 MIN	10-15 MIN	15-20 MIN	20-30 MIN	ALL DAY	1-5 MIN	5-10 MIN	10-15 MIN	15-20 MIN	20-30 MIN	ALL DAY	1-5 MIN	5-10 MIN	10-15 MIN	15-20 MIN	20-30 MIN	ALL DAY	1-5 MIN	5-10 MIN	10-15 MIN	15-20 MIN	20-30 MIN	ALL DAY	1-5 MIN	5-10 MIN	10-15 MIN	15-20 MIN	20-30 MIN	ALL DAY	
BECOMBS	7	1	1	1	1	-	2	2	-	-	1	-	3	7	7	-	-	-	8	7	4	4	4	10	7	10	10	10	10	10	
CONVILLE PLACE	12	7	10	6	5	3	21	10	2	2	-	2	24	45	7	10	5	4	2	2	17	24	5	13	11	15	26	7	10		
LONGFIELD ROAD	13	5	8	6	5	2	26	1	4	2	1	-	16	25	4	3	-	1	1	1	19	25	2	3	9	2	24	21	1	5	
MARSHALL STREET	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
MARSHALL STREET	8	2	2	4	2	1	7	2	5	2	2	-	3	20	5	-	-	-	-	7	12	3	6	2	5	4	11	-	-	-	
NORTHINGTON STREET	11	8	2	1	1	1	28	-	8	-	-	-	11	16	1	-	3	1	1	15	22	1	1	2	5	19	14	1	-	-	
PARKING	10	-	5	4	1	7	15	8	4	5	6	2	12	20	7	10	5	3	1	4	10	17	6	12	10	7	11	15	2	1	
PARK TERRACE	28	37	5	1	2	-	36	37	3	7	-	2	-	9	15	1	2	-	-	-	-	-	-	-	-	-	-	-	-	-	
PARK HILL	4	7	-	3	-	1	10	-	5	-	1	-	5	4	-	-	-	-	-	-	3	1	-	3	-	5	-	-	-	-	
QUEEN ROAD	6	1	5	1	5	-	15	15	5	16	8	5	23	40	8	10	5	1	2	2	26	35	6	10	5	12	31	32	7	12	
ROBERT TERRACE	4	5	1	5	-	7	9	6	5	4	1	5	1	1	2	-	-	5	-	-	2	7	-	1	8	8	5	11	3	2	
ROYAL STREET	6	7	2	3	1	3	11	13	4	4	3	1	10	11	3	5	1	3	1	-	11	14	9	7	1	6	10	10	2	5	
WEST ROAD	4	6	1	4	2	5	7	2	2	4	2	1	-	1	5	1	2	1	-	-	1	4	1	3	-	3	5	5	-	-	
TOTAL ON STREETS	75	122	17	40	34	45	150	184	34	68	25	30	7	12	6	14	116	220	52	59	21	17	9	14	115	163	41	70	51	66	132
CAR PARKS																															
BARN STREET	14	9	8	8	24	8	1	1	2	2	5	3	4	3	6	3	6	7	4												
WICKHAM TERRACE	16	7	1	3	31	2																									
TOTAL IN CAR PARKS	30	16	9	11	55	5	2	1	2	6	6	5	4	6	10	6	13	14	6												
TOTAL	75	152	17	56	34	52	155	190	35	70	26	31	7	14	12	20	126	226	57	65	22	17	13	20	125	173	41	76	51	70	138

CAMBRIDGE TRAFFIC PLAN.

AREA 3. - PARKING VOLUMES.
DISTRIBUTION DURING PERIOD 80AM-60PM.

W. L. WAIDE
COUNTY PLANNING OFFICER
CAMBRIDGE

E. TRAVES MORGAN & PONS
CONSULTING ENGINEERS
LONDON

DRAWING No 1538/23

STREETS.	PARKING ACCUMULATION										PARKING VOLUMES										TOTAL VOLUME		NOTES.										
	NUMBER OF VEHICLES PARKED AT VARIOUS TIMES DURING THE DAY										NUMBER OF VEHICLES WHICH ARRIVE AND PARK FOR VARIOUS DURATION IN THE PERIOD 8:00-6:00 P.M.										VOLUME												
	8:00-9:00	9:00-10:00	10:00-11:00	11:00-12:00	12:00-1:00	1:00-2:00	2:00-3:00	3:00-4:00	4:00-5:00	5:00-6:00	UNDER 1 HOUR	1 To 2 HOURS	2 To 4 HOURS	4 To 6 HOURS	ALL DAY	1956	1957																
ALEXANDER STREET	-	-	-	-	1	-	-	2	-	-	-	3	-	-	-	1	3	1. TABULATED FIGURES ARE RESULTS OF EXPOSURE COUNT OF PARKED VEHICLES ON AN OUTSIDE VEHICULAR															
BOND STREET	1	3	4	4	7	3	14	3	15	5	12	6	15	1	12	1	14	3	82	50	14	3	11	-	2. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS								
BOSTON LANE	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	3. TABULATED FIGURES ARE RESULTS OF EXPOSURE COUNT OF PARKED VEHICLES ON AN OUTSIDE VEHICULAR								
FOUR SCHOOL LANE	5	13	14	20	17	24	13	24	15	22	12	10	16	24	20	21	22	15	34	43	8	8	17	8	7	11	4	7	70	87	4. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
GREEN STREET	3	6	11	23	28	30	25	46	34	51	28	34	23	34	26	45	35	37	213	317	34	60	29	27	4	2	1	2	281	408	5. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
GREEN BUCKINGHAM STREET	1	1	4	11	10	15	13	15	12	17	14	13	14	12	17	13	10	10	51	74	16	19	2	11	2	1	-	4	113	109	6. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
BRUNNEN STREET	-	-	-	1	-	7	2	6	2	5	2	2	-	3	2	5	2	6	3	4	35	-	7	-	5	-	1	-	-	-	43	5. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS	
GREEN STREET	1	6	12	17	14	14	9	23	8	13	12	14	11	16	11	16	9	19	119	120	16	23	4	5	-	3	1	3	140	154	7. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
GREENHILL STREET	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	8. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
WHEELER STREET	8	8	11	16	21	24	23	25	22	25	13	20	20	20	16	21	16	23	137	153	29	36	15	12	2	-	2	2	185	233	9. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
JOHN LANE	6	5	22	26	26	34	28	28	26	35	21	32	23	30	21	33	30	35	245	272	44	33	12	17	6	4	3	5	310	331	10. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
WILSON STREET	5	7	22	32	21	23	34	35	26	25	32	27	28	32	31	34	30	30	245	272	44	33	12	17	6	4	3	5	310	331	11. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
WINDY HILL	3	5	9	17	24	26	29	22	32	32	34	30	25	26	26	26	33	22	186	336	27	23	13	7	3	2	1	1	232	375	12. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
WIND STREET	-	2	10	17	16	18	16	16	17	16	13	17	14	17	16	17	17	15	57	72	16	14	6	13	1	3	2	4	122	106	13. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
WINDY HILL	6	11	12	20	26	40	22	33	19	30	21	24	15	36	15	32	13	26	232	360	25	36	4	12	-	2	-	1	265	431	14. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
WINDY STREET	3	3	7	8	4	4	7	1	4	1	2	1	1	-	6	1	4	5	77	53	1	-	-	-	-	-	-	-	-	78	53	15. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS	
WINDY HILL	2	3	13	7	19	17	21	10	21	17	16	10	13	17	19	15	24	15	189	175	25	18	7	7	1	1	1	-	223	205	16. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
WINDY STREET	1	-	7	1	13	4	20	10	25	13	22	11	23	9	27	12	26	12	105	73	27	16	10	6	4	3	2	-	157	98	17. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
WINDY STREET	3	4	5	7	-	1	2	5	1	7	2	2	3	4	1	7	6	4	109	112	3	2	-	1	-	-	-	-	-	112	115	18. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS	
WINDY STREET	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	19. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
WINDY STREET	4	5	7	9	12	12	12	13	11	14	6	11	7	8	15	11	14	16	40	55	17	14	13	7	10	3	2	-	82	79	20. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
WINDY STREET	4	12	14	26	20	30	17	26	17	30	15	26	15	32	21	32	21	30	46	50	8	13	9	15	6	6	7	13	70	101	21. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
WINDY STREET	1	5	6	6	10	9	19	11	13	12	7	12	10	12	15	13	15	12	46	41	10	8	9	7	4	3	3	4	72	63	22. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
WINDY STREET	4	4	9	12	10	12	22	12	19	21	22	6	15	18	19	16	15	16	266	261	19	14	2	4	-	-	1	1	308	280	23. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
WINDY STREET	2	7	12	25	19	22	25	25	20	26	22	24	19	20	31	19	26	22	192	220	34	45	10	4	3	3	2	2	241	278	24. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
WINDY STREET	1	1	1	2	4	1	2	1	2	3	-	2	4	1	1	1	2	1	30	11	-	1	-	1	-	-	-	-	30	15	25. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
WINDY STREET	3	5	19	24	23	23	28	20	30	26	28	20	22	20	25	21	21	26	322	257	30	23	13	16	3	4	3	-	371	300	26. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
WINDY STREET	-	4	5	7	4	7	4	7	4	7	5	7	4	7	6	6	6	6	33	16	7	4	4	4	1	1	1	3	46	50	27. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
WINDY STREET	-	2	4	5	20	18	19	17	22	19	26	22	22	21	27	22	23	21	181	180	32	23	13	18	4	3	-	-	230	230	28. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
TOTAL ON STREETS	59	116	240	347	570	423	443	422	470	392	396	366	416	420	447	442	440	354	376	3205	3442	461	486	228	233	62	60	40	62	5596	4734	29. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS	
CAR PARKS	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	30. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
WINDY HILL	16	26	40	46	48	59	58	59	53	51	36	41	46	47	57	53	53	48	78	63	45	21	42	35	11	15	17	21	193	155	31. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
WINDY HILL	23	45	68	129	174	235	191	245	186	236	157	196	182	225	194	231	194	229	120	297	111	105	147	180	53	63	63	79	494	724	32. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
TOTAL IN CAR PARKS	41	71	108	175	223	294	249	304	239	287	173	237	228	272	251	284	247	277	205	254	156	126	189	215	64	78	80	100	687	879	33. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS		
TOTAL.	100	187	348	522	593	723	680	747	661	757	565	635	586	680	690	731	689	717	527	632	3463	3808	617	612	417	453	126	158	120	162	4683	5173	34. EXPOSURE COUNT TAKEN AT 10 MINUTE INTERVALS IN OUTSIDE AREAS AND 30 MINUTE INTERVALS IN OUTSIDE AREAS
CAMBRIDGE TRAFFIC PLAN.																					AREA I - HOURLY ACCUMULATIONS AND TOTAL VOLUMES 8:00 A.M. - 6:00 P.M.										DRAWING No 1538/24		

STREETS	PARKING ACCUMULATION																PARKING VOLUMES												TOTAL VOLUME 80.0-60.0	NOTES.			
	NUMBER OF VEHICLES PARKED AT VARIOUS TIMES DURING THE DAY																NUMBER OF VEHICLES WHICH ARRIVE AND PARK FOR VARIOUS PERIODS DURING THE DAY																
	8-9 A.M.		9-10 A.M.		10-11 A.M.		11 A.M.		12 Noon		1-2 P.M.		2-3 P.M.		3-4 P.M.		4-5 P.M.		5-6 P.M.		UNDER 1 HOUR		1 TO 2 HOURS		2 TO 4 HOURS		4 TO 6 HOURS				ALL DAY		
	1954	1955	1954	1955	1954	1955	1954	1955	1954	1955	1954	1955	1954	1955	1954	1955	1954	1955	1954	1955	1954	1955	1954	1955	1954	1955	1954	1955			1954	1955	
BELMONT PLACE	-	2	-	2	-	1	-	-	1	1	-	1	-	2	1	2	2	10	21	1	5	-	1	-	-	-	-	-	-	-	11	24	
CLARENDON STREET	-	5	-	4	-	6	-	10	-	10	-	7	-	7	-	7	-	10	-	10	-	15	-	8	-	5	-	1	-	-	67		
DEWING PLACE	1	-	6	16	21	20	20	20	17	19	17	17	14	12	21	18	20	17	16	19	20	55	15	8	16	18	6	10	6	2	65	69	
DEANER STREET	0	4	6	4	4	7	7	15	9	10	19	10	4	10	9	10	11	7	6	9	88	80	19	5	-	5	1	5	-	1	40	90	
PAUL STREET																																	
BAIL STREET																																	
EMMANUEL ROAD																																	
VICTORIA STREET	5	11	10	9	17	29	20	35	27	38	30	20	27	24	29	38	35	37	34	19	120	195	90	41	12	14	5	4	5	1	179	199	
NEW SQUARE	-	-	-	-	1	-	4	-	-	-	1	-	4	-	1	-	5	-	1	-	15	-	3	-	-	-	-	-	-	-	15	-	
EMMANUEL STREET																																	
PITHELLIAN STREET																																	
TOWN COURT ROAD																																	
DEANTA PLACE	2	11	9	28	20	65	19	54	22	55	18	25	22	25	28	56	21	34	16	27	55	54	25	55	14	24	5	6	5	8	102	165	
LAUNDRESS LANE	1	1	5	2	8	4	7	5	4	8	5	6	5	5	2	2	2	2	2	2	55	51	2	4	2	1	4	5	-	2	41	41	
JESUS LANE	10	8	58	51	48	61	49	45	45	62	55	57	40	55	46	61	52	60	55	52	80	58	28	55	18	32	11	17	19	22	156	208	
WIND LANE	10	12	16	16	16	20	19	15	16	16	11	15	9	12	12	17	11	16	9	10	51	52	8	5	14	7	6	4	4	7	68	50	
OSBORN LANE																																	
WIND STREET																																	
MALCOLM STREET																																	
MALCOLM STREET	-	-	4	1	10	-	9	-	10	-	10	-	7	-	15	1	17	2	14	2	55	24	12	2	8	-	-	2	-	-	75	28	
MARSH STREET	-	2	-	2	-	2	-	2	-	1	-	-	-	1	-	1	-	1	-	1	1	2	-	1	-	1	-	1	-	-	1	5	
WILL LANE	1	5	10	10	16	17	14	17	16	21	16	20	16	21	17	21	19	21	14	21	15	26	9	12	16	19	-	5	6	5	50	61	
NEW PARK STREET	12	15	16	20	12	18	12	19	15	20	19	21	15	15	11	22	10	22	15	26	58	54	13	19	11	10	4	6	4	5	90	97	
PARK STREET																																	
THOMPSON LANE																																	
EDMUND STREET																																	
EDMUND STREET	8	8	55	52	54	45	54	52	55	58	27	36	28	55	42	55	44	45	46	40	551	491	21	51	19	22	2	5	-	5	569	550	
ST ANDREW STREET	-	2	-	20	-	17	1	26	2	15	2	16	2	15	1	18	-	15	-	15	218	265	17	30	2	5	-	-	-	-	237	268	
WIND STREET	-	1	2	1	1	1	-	-	-	2	1	1	2	-	-	2	1	-	-	-	-	8	-	-	-	-	-	-	-	-	-	8	
SILVER STREET	1	1	2	5	5	5	4	5	2	2	4	6	5	4	8	6	3	4	-	5	36	26	12	5	6	5	-	-	1	2	55	36	
TOWN COURT TOWER	2	11	6	16	11	17	10	17	9	17	8	19	6	17	11	19	11	19	6	18	12	18	4	5	12	10	-	8	4	10	32	51	
TOWN LANE	5	11	5	17	25	20	27	21	24	22	24	18	20	18	21	19	20	21	16	15	50	25	11	7	11	11	5	6	11	6	68	55	
THOMPSON STREET	6	5	15	57	30	56	38	62	42	52	22	30	25	40	54	47	37	44	27	32	262	515	62	42	25	50	8	7	7	5	568	557	
TOTAL ON STREETS	82	118	205	509	291	414	505	598	317	408	267	551	265	344	534	414	329	405	272	541	1736	1996	298	525	195	224	56	88	71	67	2542	2720	
CAR PARK																																	
NEW SQUARE	56	51	50	107	110	140	125	177	144	207	160	200	160	207	160	252	175	197	160	198	120	160	107	120	104	128	45	50	58	86	484	559	
TOTAL.	138	209	255	416	401	554	428	575	461	615	427	551																			3776	3950	
CAMBRIDGE TRAFFIC PLAN.		AREA 2. - HOURLY ACCUMULATIONS AND TOTAL VOLUMES 8.0 A.M. - 6.0 P.M.																W. L. WAIDE COUNTY PLANNING OFFICE CAMBRIDGE, MASS.												J. THOMAS HARRISON & PONS CONSULTING ENGINEERS LONDON		DRAWING No 1538/25	

STREETS	PARKING ACCUMULATION										PARKING VOLUMES										TOTAL VOLUME 8:00-6:00	NOTES																																					
	NUMBER OF VEHICLES PARKED AT VARIOUS TIMES DURING THE DAY										NUMBER OF VEHICLES WHICH ARRIVE AND DEPART FOR VARIOUS DURATION IN THE PERIOD 8:00-6:00																																																
	8:00-9:00		9:00-10:00		10:00-11:00		11:00-12:00		12:00-1:00		1:00-2:00		2:00-3:00		3:00-4:00		4:00-5:00		5:00-6:00				ALL DAY																																				
	1956	1959	1956	1959	1956	1959	1956	1959	1956	1959	1956	1959	1956	1959	1956	1959	1956	1959	1956	1959			1956	1959																																			
BECONSLAND	-	2	-	4	-	6	-	6	-	12	-	14	-	12	-	15	-	14	-	14	-	35	-	23	-	5	-	2	-	-	63	1. TABULATED FIGURES ARE RESULTS OF EXPEDITED COUNTS OF PARKED VEHICLES ON AN AVERAGE WEEKDAY																											
CONVILLE PLACE	1	2	16	23	22	34	30	36	43	46	24	43	28	38	35	45	37	51	34	40	74	126	54	55	28	28	2	6	7	7	145	2. COUNTS WERE TAKEN AT 15 MINUTE INTERVALS IN CERTAIN AREAS AND 30 MINUTE INTERVALS IN OTHER AREAS																											
LINCOLN ROAD	9	11	10	26	17	30	20	35	25	29	18	19	27	28	33	29	29	27	27	22	85	112	10	20	14	10	1	5	2	9	112	3. TABULATED FIGURES INCLUDE PRIVATE CARS, COMMERCIAL VEHICLES AND MOTOR CYCLES																											
MADOLANE STREET	-	-	3	-	6	1	10	2	14	1	12	-	6	1	10	1	12	-	5	-	-	8	-	-	-	-	-	-	-	-	-	8	4. A PARKING ACCUMULATION IS THE NUMBER OF PARKED VEHICLES AT ANY PARTICULAR TIME OF THE DAY																										
MADON CAMBRIDGE	2	3	5	6	5	15	10	14	8	16	4	13	5	12	5	16	6	20	4	13	22	33	7	19	6	11	3	3	-	1	58	5. A PARKING VOLUME IS THE NUMBER OF VEHICLES WHICH ARRIVE AND DEPART DURING A PERIOD OF TIME																											
NORTHAMPTON STREET	4	5	6	9	6	16	7	17	5	17	6	11	11	18	7	17	6	12	5	9	69	84	4	9	5	9	2	4	-	2	76																												
PRESIDE	3	4	10	15	14	20	23	27	23	26	22	40	23	31	25	37	24	34	19	22	49	79	18	28	25	20	4	15	4	3	98																												
PARK TERRACE	7	9	19	14	21	19	18	21	7	11	4	10	4	2	6	-	6	3	3	6	87	106	12	12	3	3	-	-	1	-	103																												
POUND HILL	1	5	4	14	6	17	4	20	7	16	5	12	7	13	6	12	5	13	5	12	13	29	1	7	1	8	-	1	4	7	19																												
QUEEN ROAD	-	2	1	12	7	29	17	48	35	57	31	45	34	36	30	32	36	38	29	35	98	192	27	31	23	24	5	15	1	4	154																												
ROBERT TERRACE	12	20	17	27	17	28	20	29	19	30	16	28	17	21	21	29	22	24	24	29	15	45	7	17	17	16	1	11	12	9	90																												
SILVER STREET	3	8	5	8	5	10	19	19	15	19	18	10	16	16	13	17	17	20	12	22	48	55	22	26	6	16	5	3	1	4	82																												
WEST ROAD	1	6	5	12	5	16	12	20	11	18	6	16	4	14	4	15	2	19	3	11	18	22	5	13	3	11	1	5	1	5	50																												
TOTAL ON STREETS	59	77	109	170	135	241	186	286	214	298	166	261	182	242	203	285	204	289	168	250	972	884	147	280	151	186	24	68	33	51	907	1,499																											
CAR PARKS																																																											
SAVON STREET	95		47		44		42		47		40		42		43		43		38		55		20		19		13		26		119																												
WILKINSON TERRACE	44		44		43		43		41		44		47		55		53		51		30		19		8		6		35		98																												
TOTAL IN CAR PARKS	99		91		87		87		88		84		89		98		96		89		69		39		27		19		61		211																												
TOTAL.																												59	176	109	261	135	328	186	573	214	386	166	345	182	331	203	381	204	387	168	339	972	949	147	319	151	185	24	87	33	112	907	1,650
CAMBRIDGE TRAFFIC PLAN.														AREA 3. - HOURLY ACCUMULATIONS AND TOTAL VOLUMES 8:00 A.M. - 6:00 P.M.														W. L. WATERS COUNTY PLANNING OFFICE, CAMBRIDGE, MASS.				E. T. HARRIS COUNTY PLANNING OFFICE, CAMBRIDGE, MASS.				DRAWING No 1538/26																							

VEHICLES PARKED ON AN AVERAGE WEEKDAY IN 1959

July (Out of Term)

Area	Duration of Stay	Nos. Parked at Peak Period (12 noon)			Total Parked During Day (8 a.m. to 6 p.m.)		
		Private	Commercial	Total	Private	Commercial	Total
AREA 1							
Streets (Inner zone of meter area)	Under 1 hr.	156	40	196	2,628	820	3,448
	1 - 2 hrs.	82	4	86	440	46	486
	2 - 4 hrs.	82	4	86	221	17	238
	Over 4 hrs.	99	3	102	115	7	122
	All	419	51	470	3,404	890	4,294
Car Parks:- Lion Yard and Market Square	Under 1 hr.	33	4	37	330	30	360
	1 - 2 hrs.	23	3	31	118	8	126
	2 - 4 hrs.	82	10	92	189	26	215
	Over 4 hrs.	112	17	129	163	15	178
	All	255	34	289	800	79	879
AREA 2							
Streets (Outer zone of meter area)	Under 1 hr.	102	22	124	1,597	399	1,996
	1 - 2 hrs.	67	3	70	295	30	325
	2 - 4 hrs.	64	2	66	216	8	224
	Over 4 hrs.	148	9	157	170	5	175
	All	381	36	417	2,278	442	2,720
Car Parks:- New Square	Under 1 hr.	25	3	28	123	37	160
	1 - 2 hrs.	17	2	19	108	12	120
	2 - 4 hrs.	44	9	53	106	17	123
	Over 4 hrs.	102	11	113	122	14	136
	All	188	25	213	459	80	539
AREA 3							
Streets	Under 1 hr.	68	9	77	781	103	884
	1 - 2 hrs.	51	4	55	256	24	280
	2 - 4 hrs.	56	2	58	153	3	156
	Over 4 hrs.	109	-	109	115	4	119
	All	284	15	299	1,305	134	1,439
Car Parks:- Saxon Street Warkworth Street	Under 1 hr.	3	1	4	60	5	65
	1 - 2 hrs.	1	-	1	38	1	39
	2 - 4 hrs.	8	-	8	26	1	27
	Over 4 hrs.	75	-	75	79	1	80
	All	87	1	88	203	8	211
WHOLE SURVEY AREA, STREETS & CAR PARKS							
	Under 1 hr.	387	78	466	5,519	1,394	6,913
	1 - 2 hrs.	246	16	262	1,255	121	1,376
	2 - 4 hrs.	336	27	363	911	72	983
	Over 4 hrs.	645	40	685	764	46	810
	All	1,614	162	1,776	8,449	1,633	10,082

Table 19 (7.13)

SUMMARY OF PAST GROWTH PATTERNS 1956 = 100

		1956	1957	1958	1959	1960	1961	1962
Population	Cambridge-shire	100	101	101	102	103	105	107
	City of Cambridge	100	100	101	101	102	103	104
Vehicles registered.	All vehicles	100	104	110	120	129	136	143
	Cars	100	105	113	126	134	146	158
Vehicles per Head	All vehicles	100	103	109	118	125	129	133
	Cars	100	105	112	123	130	136	145
Traffic - Cambridge	Centre	100		111		127		
	Inner ring	100		116		136		
	Boundary	100		105	114			
Parking (areas 1, 2, & 3)	Fri. Peak Accumulation	100			129		152	149
	Volume 8 a.m. - 6 p.m.	100			120			
National Trends	Population	100	101	101	102	102	103	104
	Vehicles Registered	100	107	114	125	135	143	152
	Vehicles per head	100	107	113	123	133	136	146
	Traffic	100	99	115	129	139	149	155

VEHICLES PER HOUR ON AN AVERAGE WEEKDAY
ON MAIN STREETS IN THE CITY

MAY, 1960

Street	Average v. p. h. 8.30 a. m. - 6.0 p. m.	Peak Hour 5.0 p. m. - 6.0 p. m.	Ratio Peak to Average
King's Parade	531	647	1.22
Trinity Street	565	691	1.22
Market Street	467	544	1.16
Sidney Street (one-way)	502	625	1.24
St. Andrew's Street	709	864	1.22
Downing Street	319	389	1.22
Regent Street	687	842	1.23
Bridge Street (two-way)	768	994	1.29
Silver Street (east end)	331	424	1.28
Tennis Court Road	146	161	1.14
Emmanuel Street	392	517	1.32
Victoria Avenue	1,337	1,744	1.30
Emmanuel Road	718	872	1.21
Parkside	689	898	1.30
Gonville Place	874	1,169	1.34
Lenafield Road	699	1,026	1.47
Fen Causeway	804	1,195	1.49
Queen's Road	689	1,034	1.50
Newmarket Road (Abbey Church)	1,123	1,435	1.28
Victoria Road	421	554	1.32
Chesterston Lane	657	859	1.31
Mill Road (Sorting Office)	604	787	1.30

PRIVATE PARKING AREAS, 1961

October 19th, 20th and 21st - 3.30 p.m.

	Thursday p.m.			Friday p.m.			Saturday p.m.		
	Private	Comm. Vehicles	Total	Private	Comm. Vehicles	Total	Private	Comm. Vehicles	Total
<u>University:-</u>									
Old Schools Yard, Trinity Lane	10	1	11	12	3	15	1	-	-
Arts School, Bene't Street	3	-	3	3	-	3	-	-	-
Museums site, Downing Street	55	5	60	66	9	75	16	1	17
Downing site	171	21	192	239	9	248	37	6	43
Chem. Eng. Labs. Tennis Court Rd.	6	-	6	4	2	6	-	1	1
Maths. Lab. St. Andrew's Hill	9	-	9	9	-	9	12	-	12
Chemical Labs. Lensfield Rd.	42	-	42	48	-	48	9	-	9
Engineering Labs. Trumpington St.	48	2	50	51	1	52	8	1	9
	344	29	373	432	24	456	83	9	92
<u>College:-</u>									
Magdalene College, Mallory Court	22	-	22	23	-	23	16	-	16
St. John's College	3	2	5	16	-	16	8	-	8
Sidney Sussex College, King St.	6	-	6	6	-	6	8	-	8
Christ's College, Hobson St.	7	-	7	6	-	6	7	-	7
Trinity College, main gate	2	-	2	4	-	4	7	-	7
Trinity College, New Court,	15	-	15	9	-	9	11	-	11
King's College, main gate	7	-	7	6	-	6	4	-	4
King's College, Fountain Ct.	6	1	7	10	-	10	4	-	4
St. Catherine's College, Queen's La.	-	-	-	4	-	4	-	-	-
Emmanuel College, Emmanuel St.	5	-	5	4	-	4	4	1	5
Pembroke College, Pembroke St.	5	1	6	12	1	13	8	1	9
Downing College, Regent St.	4	-	4	5	1	6	6	-	6
Downing College, Tennis Court Rd.	8	-	8	7	-	7	3	-	3
Queen's College, Silver St.	6	-	6	13	-	13	3	-	3
Trinity Place	10	-	10	12	-	12	14	-	14
	106	4	110	137	2	139	103	2	105
<u>TOTAL University and College</u>	450	33	483	569	26	595	186	11	197
<u>Local and Central Government:-</u>									
Post Office Telephones, Park Terr.	55	2	57	51	2	53	1	1	2
Addenbrooke's Hospital, front	50	2	52	48	5	53	22	2	24
Addenbrooke's Hospital, rear	32	2	34	33	1	34	14	-	14
Guildhall, Peas Hill	3	-	3	5	-	5	2	-	2
St. Andrew's Hill, Private Park	12	-	12	17	-	17	7	-	7
	152	6	158	154	8	162	46	3	49
<u>Commercial and Miscellaneous:-</u>									
Owen Webb House, Gonville Place	5	2	7	15	-	15	6	-	6
Prudential underground park	19	-	19	14	-	14	-	closed	-
Bradwells Court underground park	3	-	3	8	-	8	6	1	7
	27	2	29	37	-	37	12	1	13
<u>TOTAL Government, Commercial etc.</u>	179	8	187	191	8	199	58	4	62
<u>Other Commercial and Misc. not surveyed in 1961 (assumed to be same as in 1956)</u>			97			42			*
<u>GRAND TOTALS</u>			767			836			259*

N.B. * Saturday p.m. - no count in 1956.

Table 22 (10.04)

TOTAL VEHICLES PARKED IN STREETS AND PUBLIC CAR PARKS - 1961

October 19th, 20th and 21st - 3.30 p.m. (in term)

		Thursday p.m.		Friday p.m.		Saturday p.m.	
		Private Cars	Comm. Vehicles	Private Cars	Comm. Vehicles	Private Cars	Comm. Vehicles
<u>AREA 1 (red)</u>							
<u>Street Parking</u>	Authorised:-						
	2 hour	14	1	15	1	16	-
	20 minute	34	1	44	2	44	-
	Taxi ranks		5		4		8
	Not Authorised	277	61	357	50	435	23
		325	68	416	57	495	31
<u>Car Parks</u>	Market Hill	41	4	45	4	-	-
	Lion Yard	135	8	230	6	225	14
		176	12	275	10	225	14
<u>TOTAL Streets and Parks</u>		501	80	691	67	720	45
<u>AREA 2 (blue)</u>							
<u>Street Parking</u>	Authorised:-						
	2 hour	60	-	66	2	64	7
	20 minute	44	9	65	6	69	2
	Taxi ranks		4		2		12
	Not Authorised	275	17	458	39	535	23
		379	30	589	49	668	44
<u>Car Parks</u>	New Square	87	3	186	2	304	6
<u>TOTAL Streets and Parks</u>		466	33	775	51	972	50
<u>AREA 3 (green)</u>							
<u>Street Parking</u>	Authorised:-						
	2 hour	117	4	129	11	136	3
	20 minute	-	-	-	-	-	-
	Taxi ranks	-	-	-	-	-	-
	Not Authorised	169	11	229	24	361	11
		286	15	358	35	497	14
<u>Car Parks</u>	Saxon Street	53	3	58	2	85	-
	East Road Corner	101	3	73	3	196	6
	Warkworth Street	43	2	50	-	69	-
	Merton Arms	13	1	10	2	12	1
		210	9	191	7	362	7
<u>TOTAL Streets and Parks</u>		496	24	549	42	859	21
<u>WHOLE SURVEY AREA - AREAS 1, 2 and 3</u>	Street Parking	990	113	1,363	141	1,660	89
	Car Parks	473	24	652	19	891	27
<u>TOTAL Streets and Parks</u>		1,463	137	2,015	160	2,551	116

Table 23 (10.05)

DAILY VARIATION MID AFTERNOON PARKING

ACCUMULATIONS - FRIDAY = 100

		1949 Jan.	1956 July.	1959 July	1961 Oct.	1962 Feb.	1962 April.
AREA 1	Thursday		63	81	78	86	73
	Friday		100	100	100	100	100
	Saturday		100	84	101	90	90
AREA 1 & 2	Thursday		69	74	68	78	69
	Friday	100	100	100	100	100	100
	Saturday	149	121	98	113	102	110
AREA 1, 2 & 3	Thursday		73	76	73	83	72
	Friday		100	100	100	100	100
	Saturday		130	107	123	107	116

Table 24 (10. 14)

TRENDS IN MOTOR VEHICLES IN USE

Vehicles for which Licences were current at any time
during the Quarter ended 30th September

CAMBRIDGESHIRE

Population		Total Vehicles	Private Cars	Vehicles per head	Private Cars per head
1951	175,300	24,443	12,903	0.14	0.07
1952	176,300	29,595	15,833	0.17	0.09
1953	177,100	31,320	15,115	0.18	0.09
1954	179,700	32,282	16,676	0.18	0.09
1955	179,800	35,098	18,315	0.19	0.10
1956	181,100	37,592	20,051	0.21	0.11
1957	182,200	38,988	21,099	0.21	0.12
1958	183,200	41,449	22,589	0.23	0.12
1959	184,500	45,089	25,078	0.24	0.14
1960	186,260	48,327	26,838	0.26	0.14
1961	191,000	51,050	28,780	0.27	0.15
1962	193,390	53,720	31,750	0.28	0.16

GREAT BRITAIN

Population		Total Vehicles	Private Cars	Vehicles per head	Private Cars per head
1951	48,854,000	4,620,888	2,380,343	0.09	0.05
1952	49,070,000	4,899,914	2,508,102	0.10	0.05
1953	49,227,000	5,282,222	2,761,654	0.11	0.06
1954	49,397,000	5,770,447	3,099,547	0.12	0.06
1955	49,574,000	6,409,433	3,525,858	0.13	0.07
1956	49,812,000	6,916,908	3,887,908	0.14	0.08
1957	50,057,000	7,425,489	4,186,631	0.15	0.08
1958	50,278,000	7,902,313	4,548,530	0.16	0.09
1959	50,578,000	8,604,980	4,965,774	0.17	0.10
1960	50,963,000	9,383,140	5,525,828	0.18	0.11
1961	51,250,000	9,906,900	5,978,500	0.19	0.12
1962	51,853,000*	10,505,300	6,558,300	0.20	0.13

Estimated saturation level

0.60

0.37

* Scotland 1961 population

GROWTH FACTORS 1956 - ULTIMATE

	A Huntingdon Road	B Madingley Road	C Barton Road	D Trumpington Road	E Hills Road	F Mill Road	G Newmarket Road	H Chesterton Road	J Milton Road	K Histon Road
B Madingley Road	4.6									
C Barton Road	6.3	5.1								
D Trumpington Road	4.8	4.6	6.6							
E Hills Road	4.8	4.1	5.6	5.3						
F Mill Road	3.5	2.8	3.9	3.7	3.2					
G Newmarket Road	4.4	4.1	5.1	4.8	4.1	2.8				
H Chesterton Road	4.1	3.3	4.6	4.3	3.7	2.6	3.0			
J Milton Road	5.8	4.7	6.5	5.0	5.2	3.6	4.0	4.2		
K Histon Road	7.0	5.7	7.8	7.4	6.3	4.3	5.7	5.1	7.2	
Central and Urban Zones W, X, Y & Z.	3.8	3.2	4.1	4.0	3.8	2.6	3.3	2.9	4.9	5.0

ESTIMATED TRAFFIC DIVERTED TO FUTURE ROAD PROPOSALS

Route	Section	1956 Average Hourly Flow	Redistribution of 1956 Movements after provision of new road facilities by stages - Average hourly flows				
			After Completion Chesterton Bridge	Chesterton Bridge and Inner Relief Route Completed	All new Facilities Completed	Estimated Distribution of Ultimate Traffic Movements (Hourly Traffic Flow).	Width of Road ultimately Required
Chesterton Bridge Route	East Road	360	600	925	880	3100	D2L
	Chesterton Bridge		705	690	625	2750	D2L
	Milton Road Link		210	180	145	830	S24
	Chesterton Road (East)	290	385	530	525	1790	D2L or E
Silver St.		300	290	290	290	720	
Magdalene Bridge		640	580				
Inner Relief Route	Section 1			330	315	1140	S. 36
	Section 2			425	410	1010	S. 36
	Jesus Lane (3)	295	295	650	635	1540	E
	Emmanuel Rd (4)	540	335	1160	1140	3190	D2L
	Parkside (5)	520	385	1140	1120	3180	D2L
	Gonville Place (6)	710	795	1180	1110	3500	D2L
	Lensfield Road (7)	555	605	755	710	2330	D2L
Victoria Ave. Route	Victoria Avenue	1110	550	765	745	2100	D2L
	Chesterton Rd (West)	455	395	605	605	2060	D2L
The Backs	Queens Road	490	410	365	310	990	E
	Fen Causeway	610	535	505	370	1250	E
New West Rd	Chaucer Rd Extn				150	860	S. 24
	New West Road				75	550	S. 24
Eastern By-Pass	Coldhams Lane Link				50	270	S. 24
	Cam Causeway				70	370	S. 24

KEY

D2L - Dual carriageway 2 Lane
 S.36 - Single carriageway 36' wide
 S.24 - Single carriageway 24' wide
 E - Carriageway as existing

AREA COVERED BY TRAFFIC VOLUME DATA



Figure 1 4-02

PAST GROWTH TRENDS OF TRAFFIC

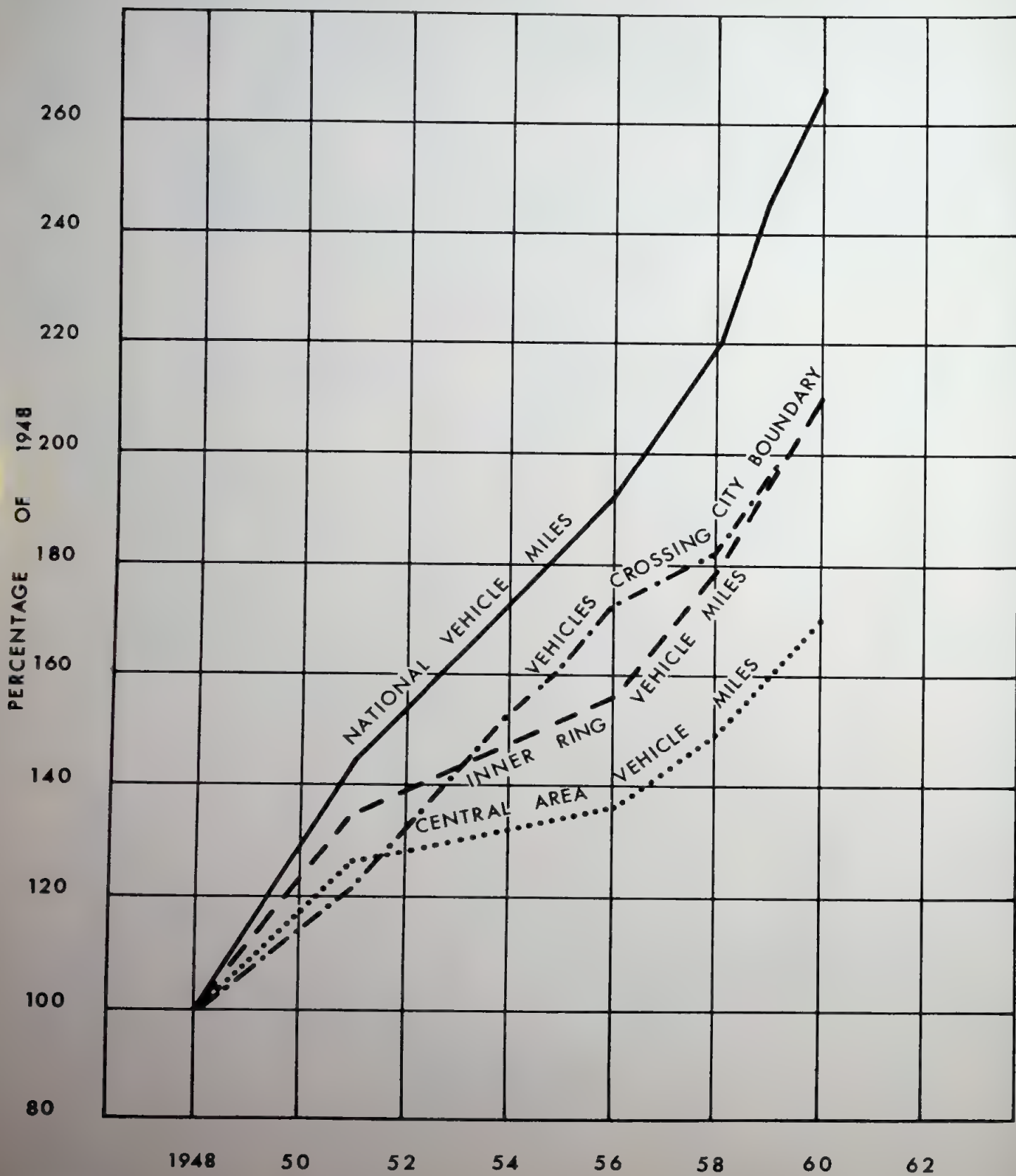


Figure 2 4-17

1956 ORIGIN & DESTINATION CENSUS



Census points. 12
 Census zones. W

Figure 3 5-01

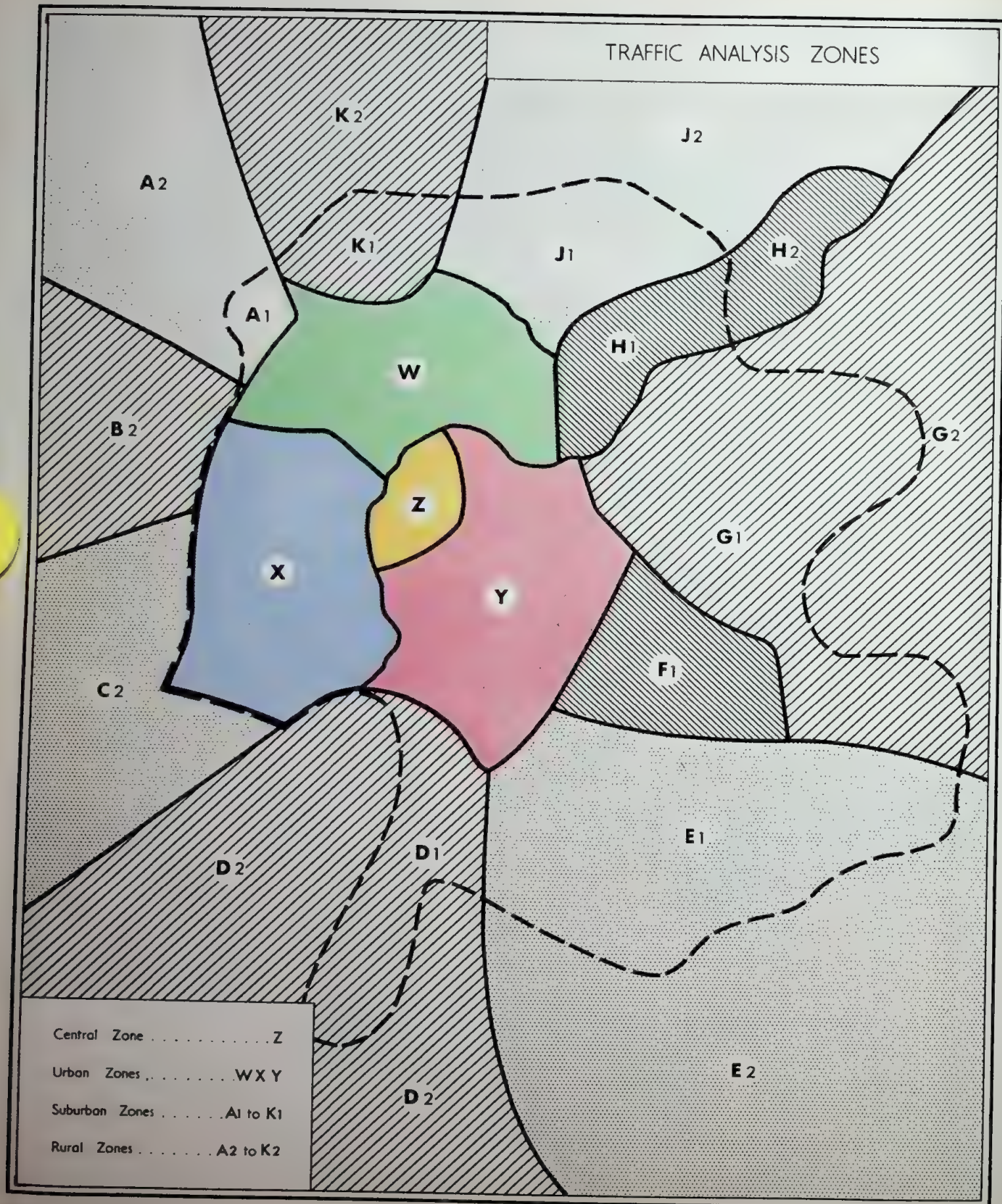


Figure 4 5-01 & 9-06

TRAFFIC DESIRE LINES

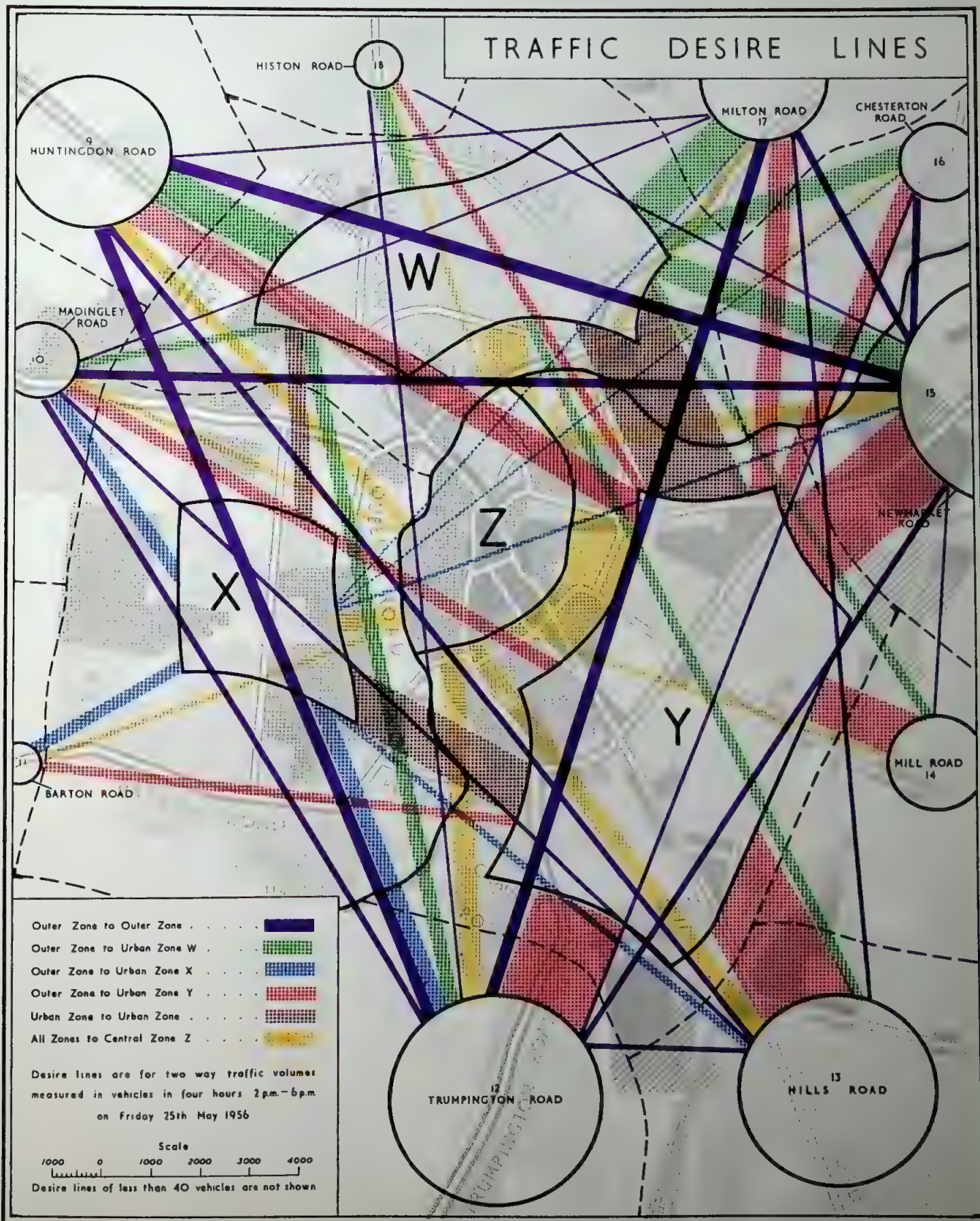


Figure 5 5-10

DISTRIBUTION OF TRAFFIC SPEEDS

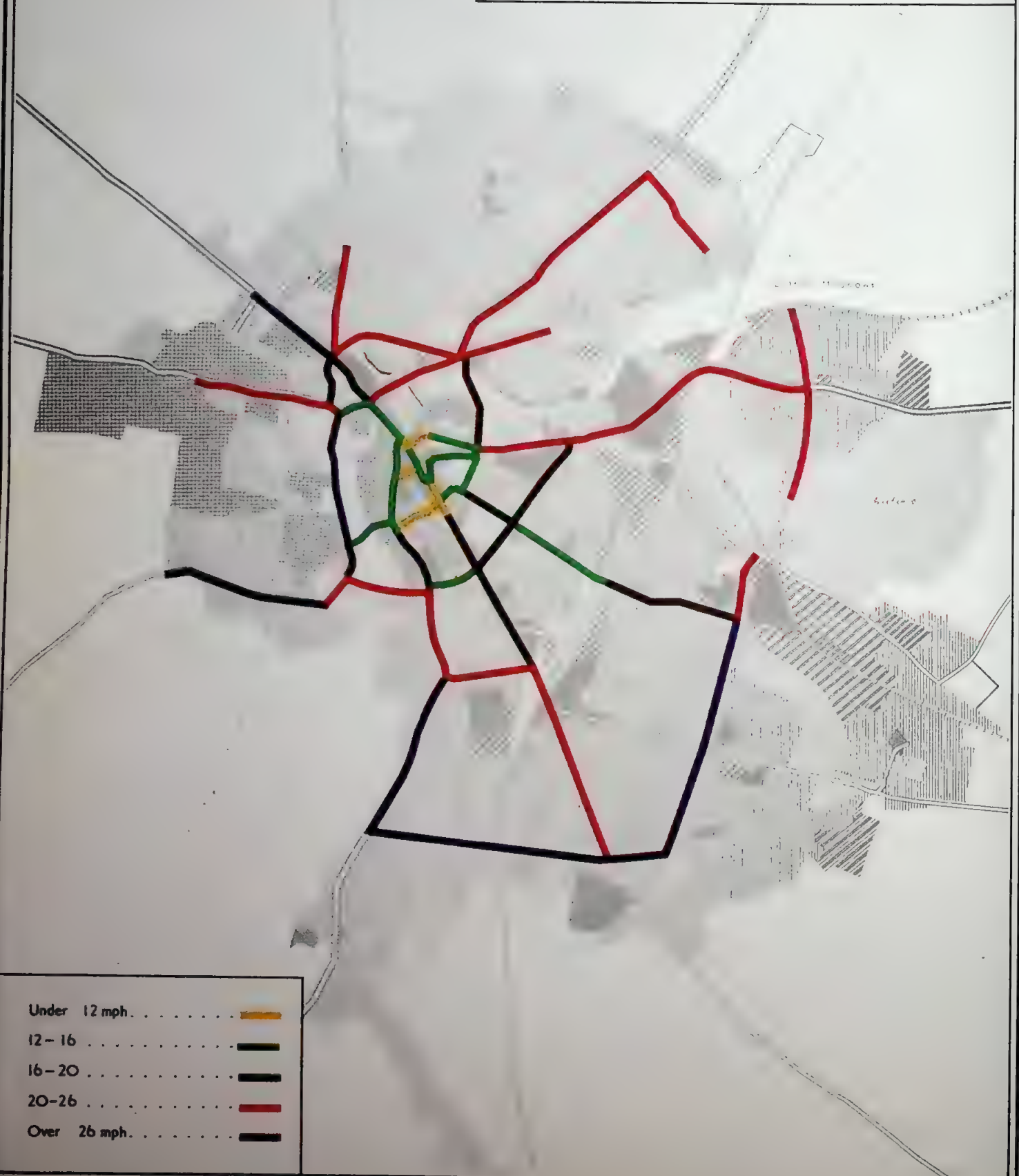


Figure 6 6-06

AREA COVERED BY PARKING SURVEY

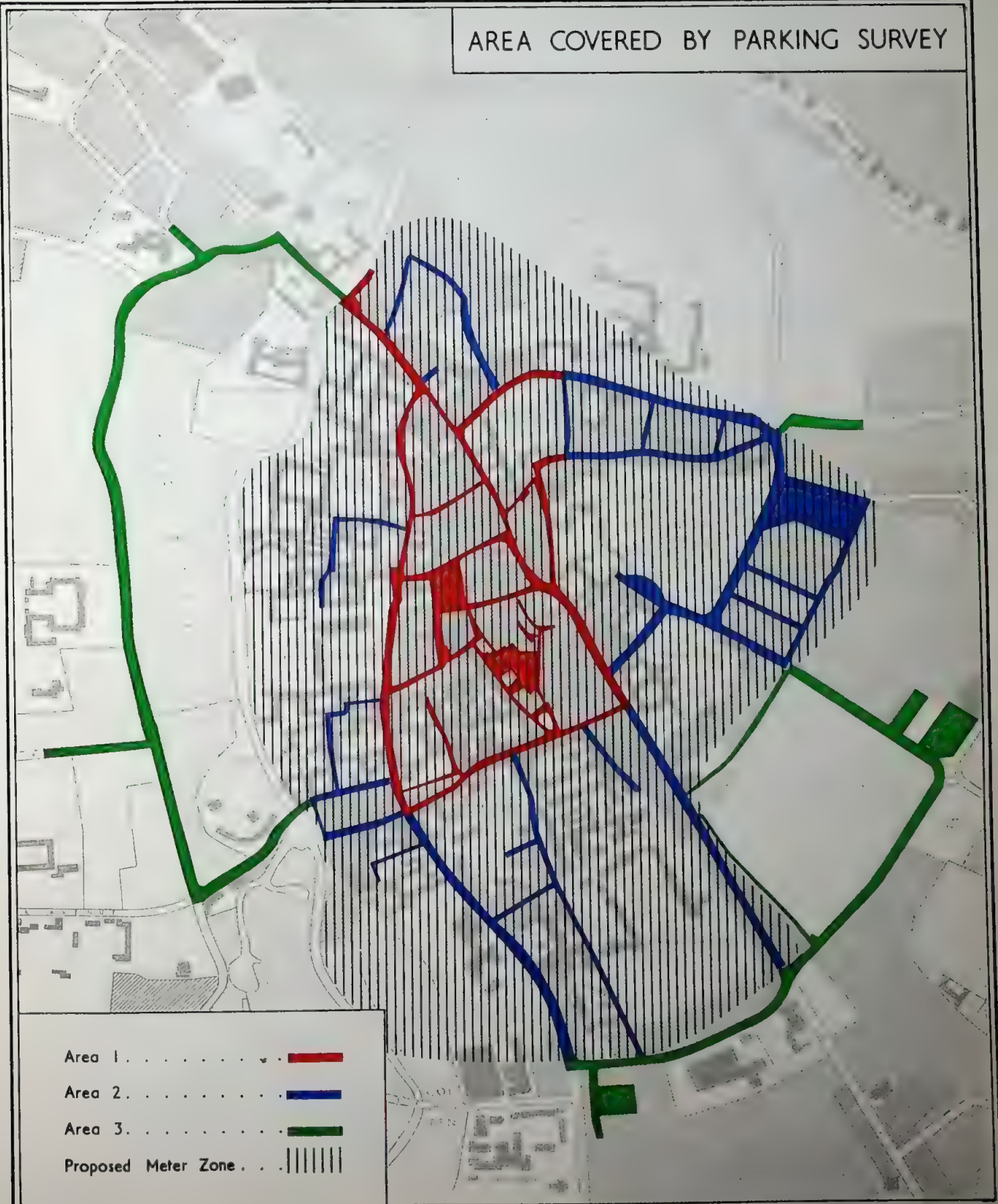


Figure 7 7-05

TOTAL VEHICLES PARKED IN THE SURVEY AREA [AREAS 1,2 & 3] ON AN AVERAGE WEEKDAY

Excluding those in private parks and garages

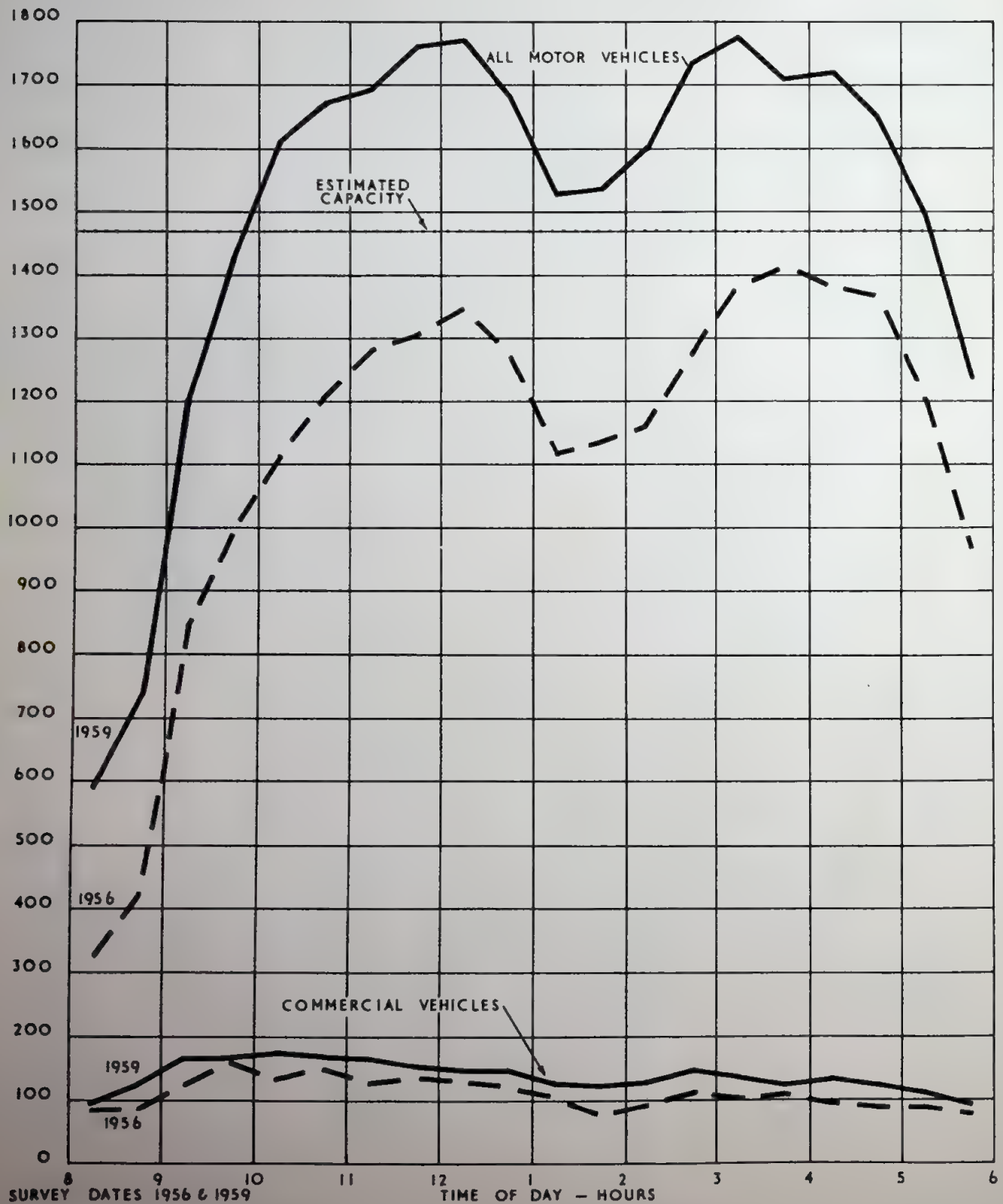
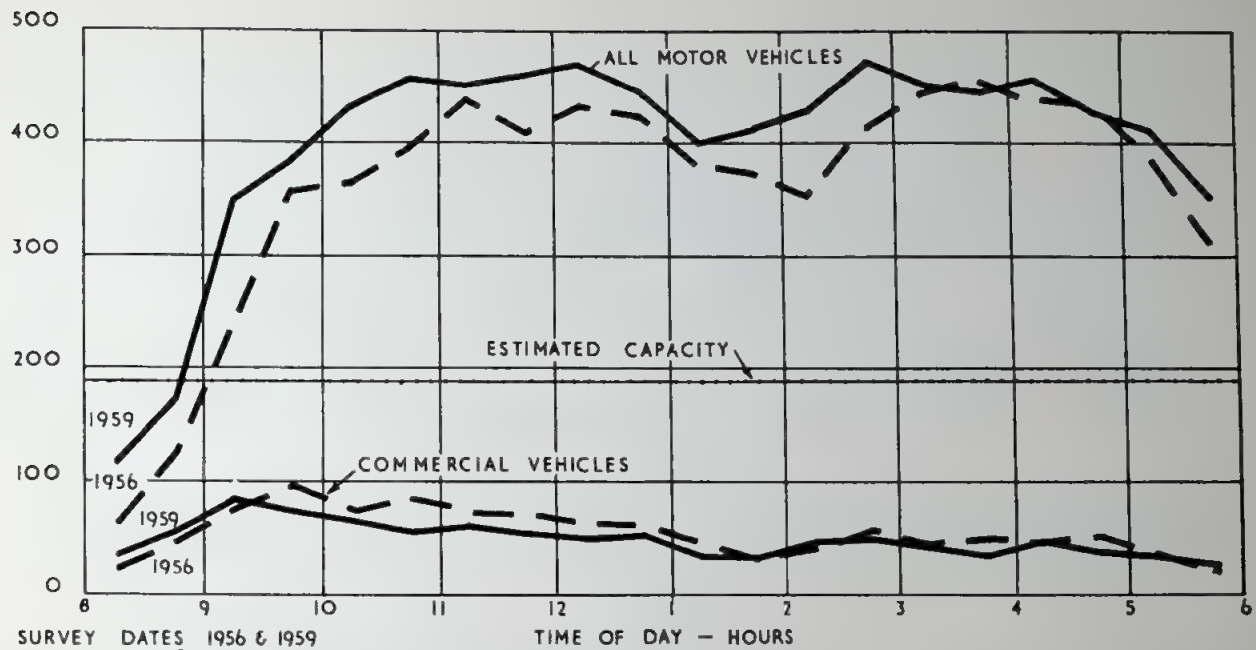


Figure 8 (7.16)

TOTAL VEHICLES PARKED IN STREETS IN AREA I ON AN AVERAGE WEEKDAY



TOTAL VEHICLES PARKED IN PUBLIC CAR PARKS IN AREA I ON AN AVERAGE WEEKDAY

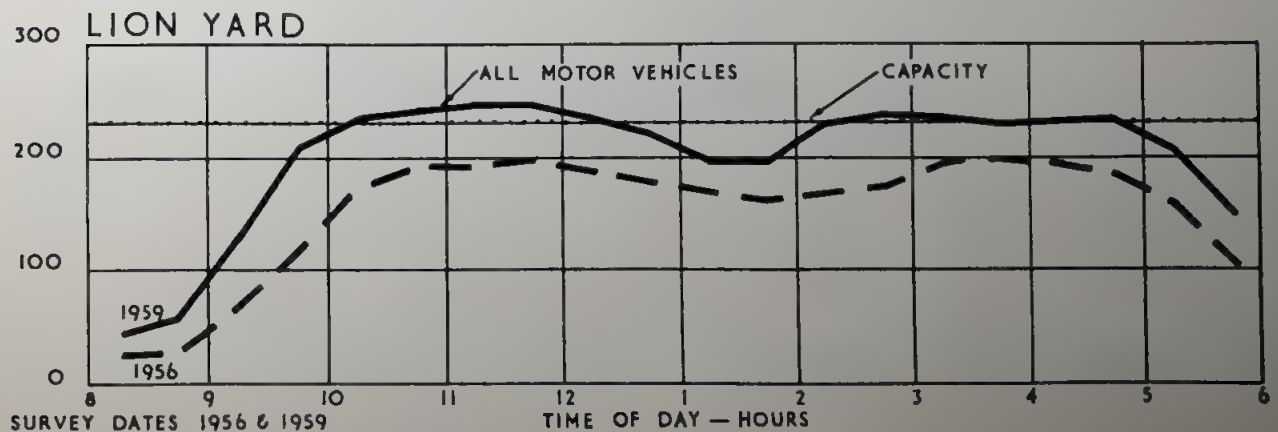
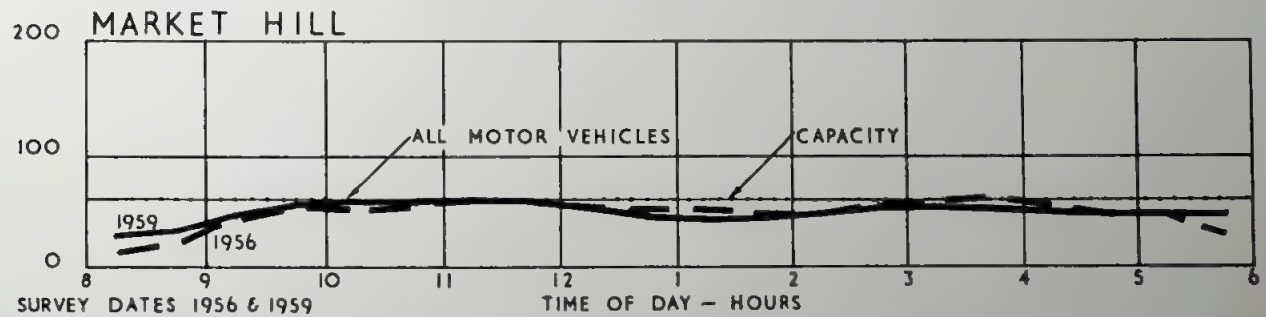
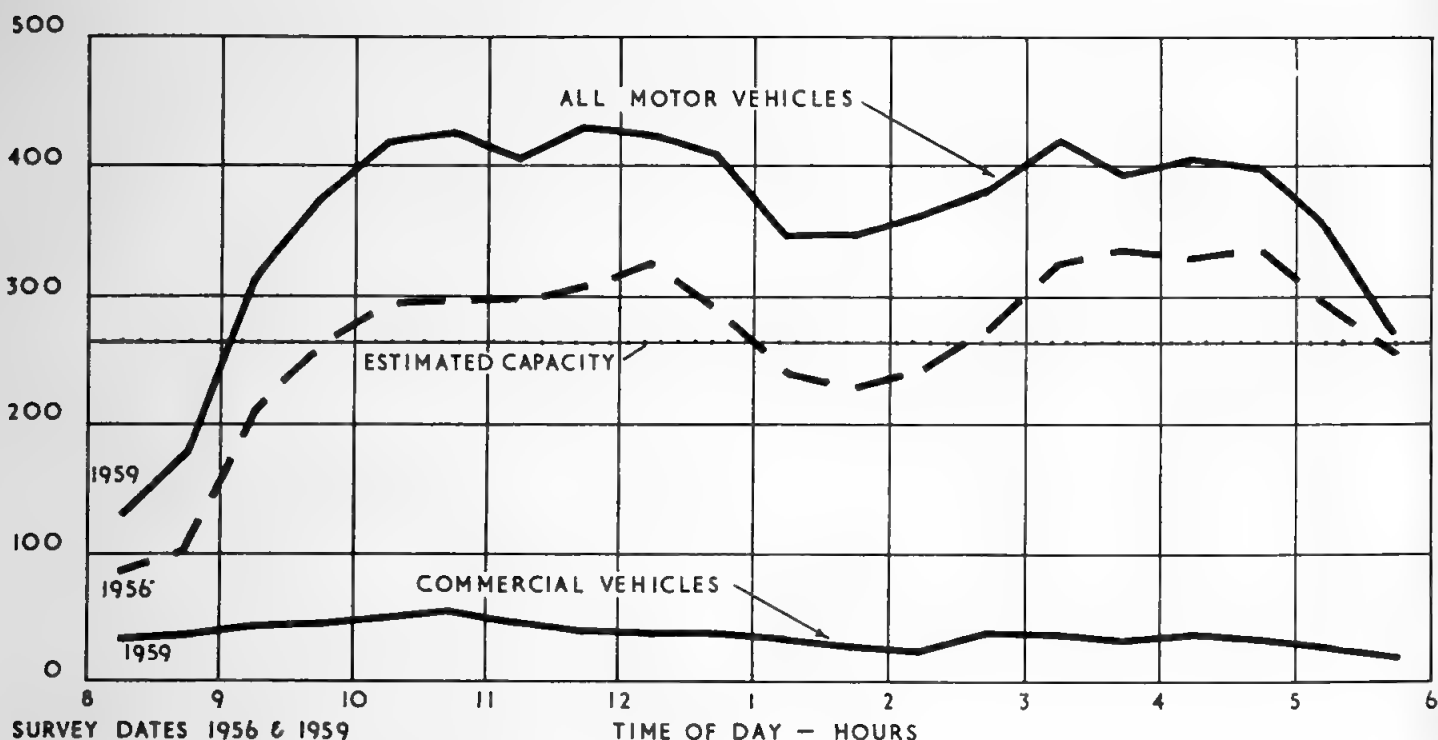


Figure 9 (7.16)

TOTAL VEHICLES PARKED IN STREETS IN AREA 2 ON AN AVERAGE WEEKDAY



TOTAL VEHICLES PARKED IN PUBLIC CAR PARKS IN AREA 2 ON AN AVERAGE WEEKDAY

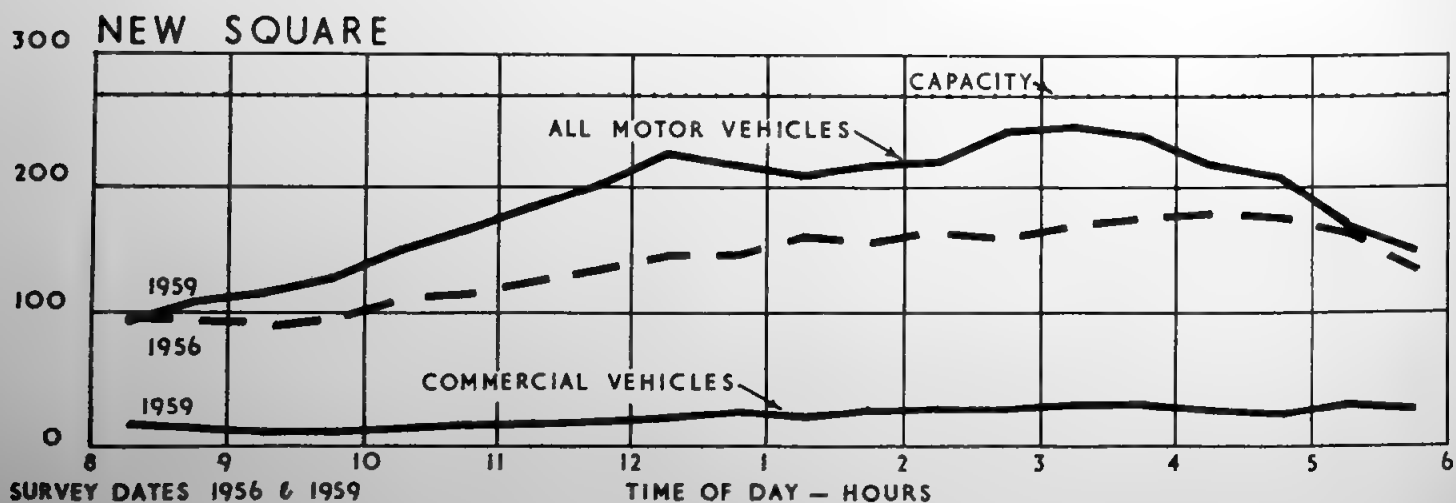
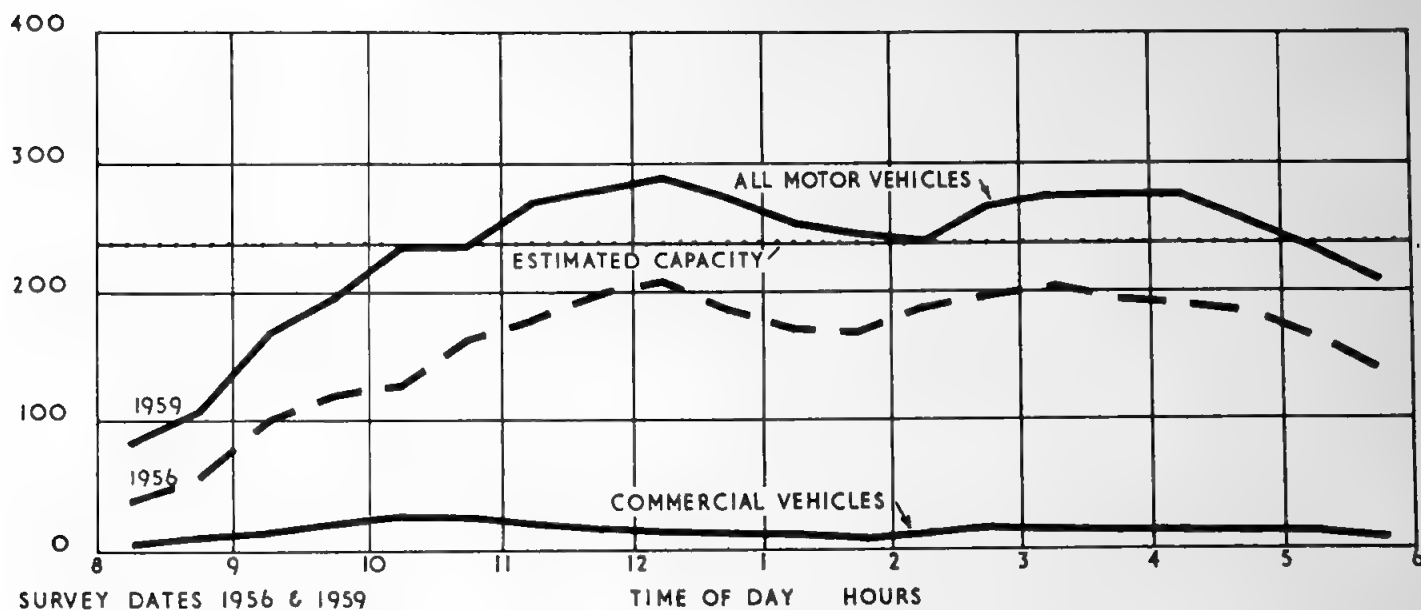


Figure 10 (7.16)

TOTAL VEHICLES PARKED IN STREETS IN AREA 3 ON AN AVERAGE WEEKDAY



TOTAL VEHICLES PARKED IN PUBLIC CAR PARKS IN AREA 3 ON AN AVERAGE WEEKDAY

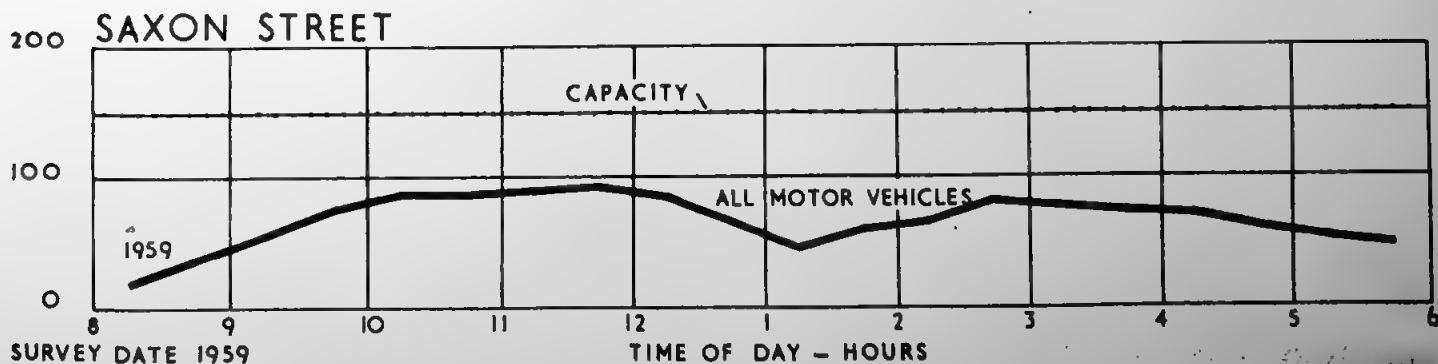
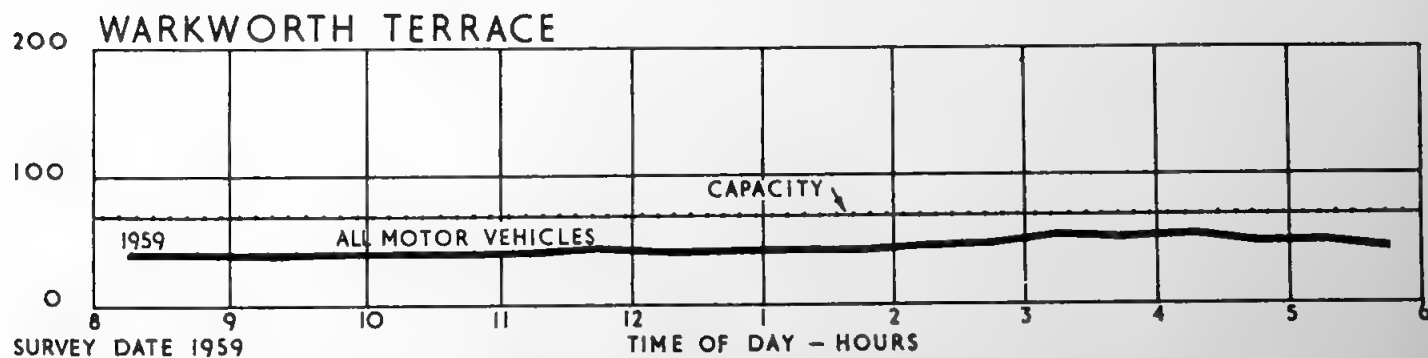


Figure 11 (7.16)

COMPARISON OF PAST GROWTH PATTERNS

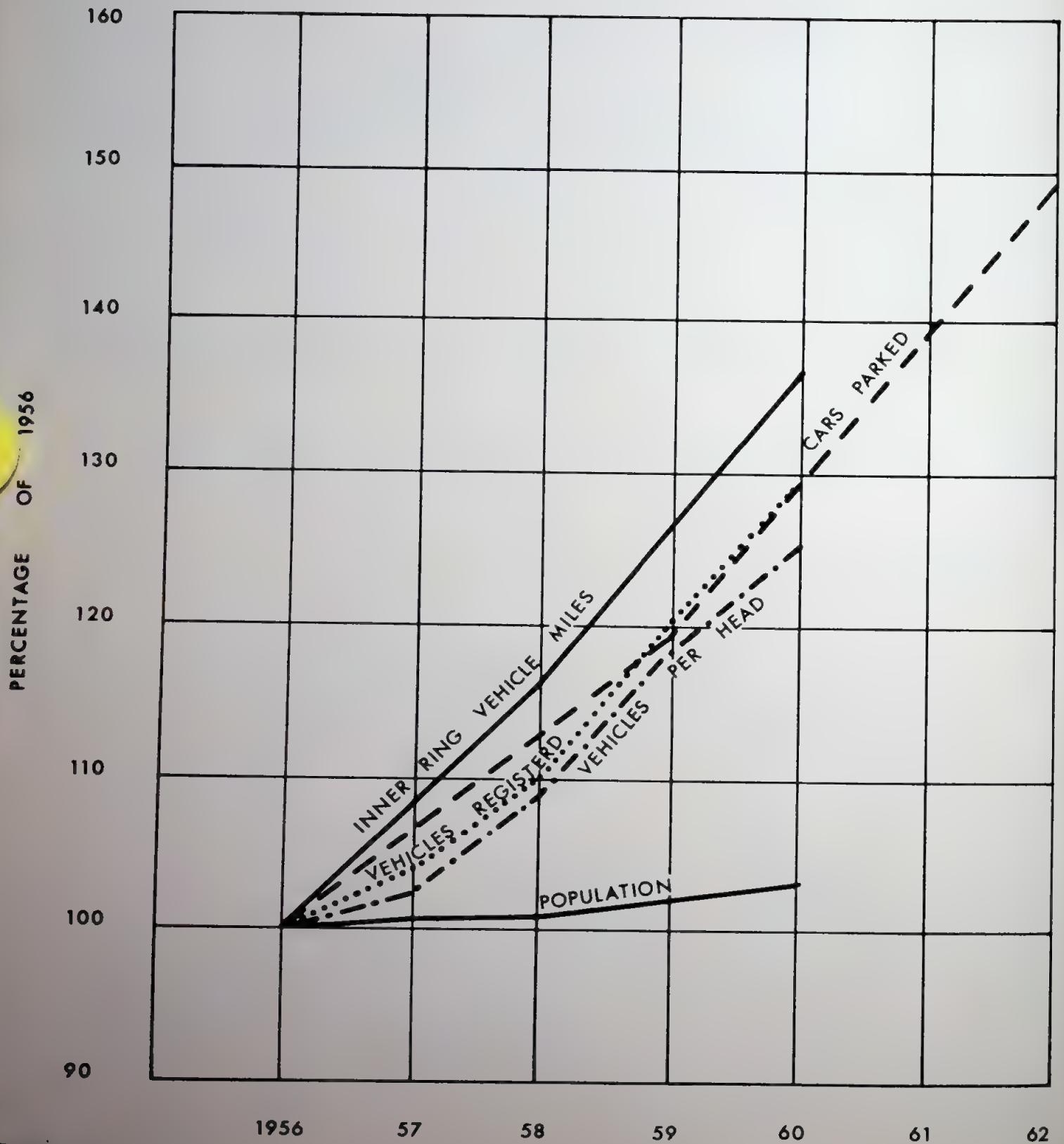


Figure 12 8-02

DISTRIBUTION OF TRAFFIC

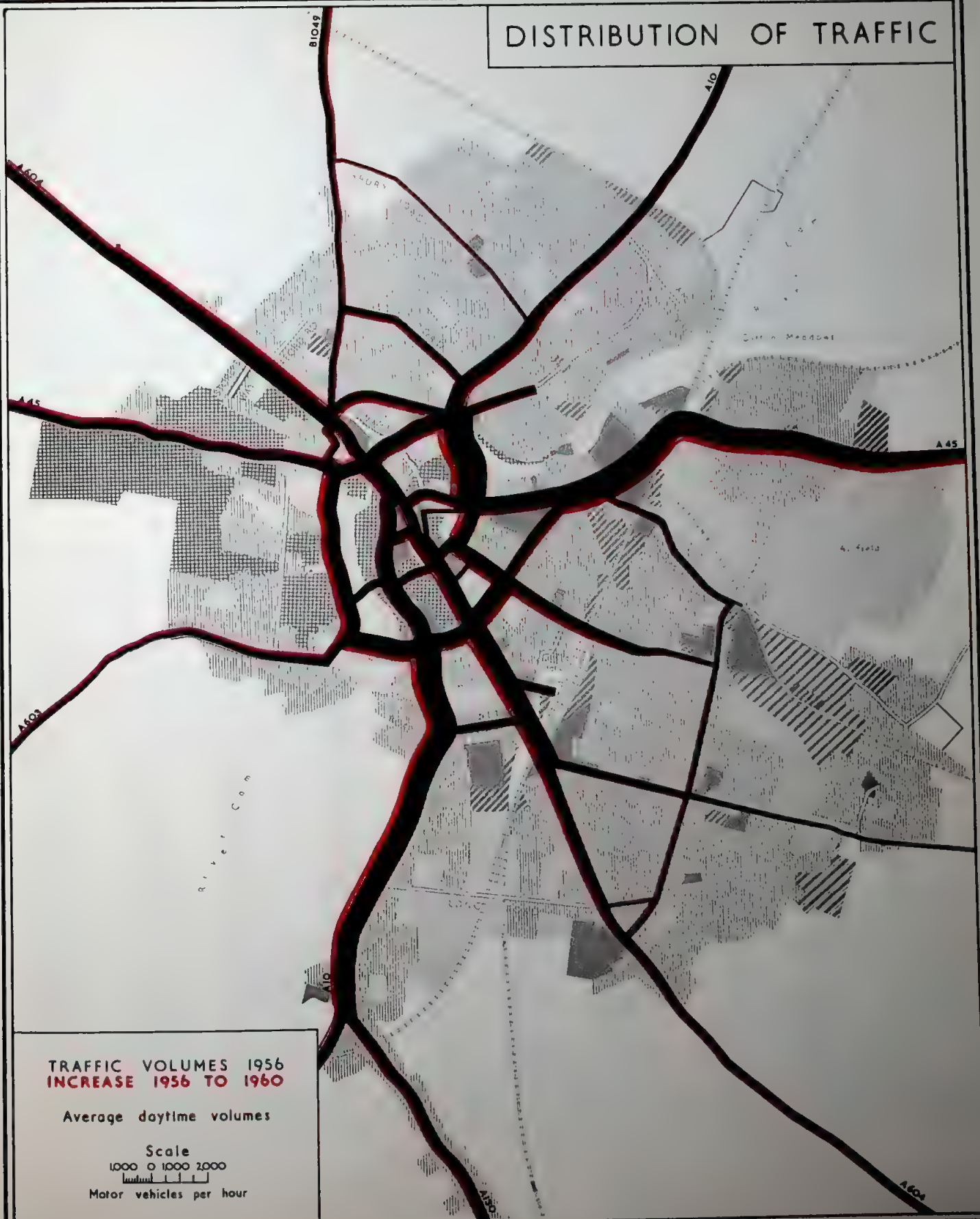
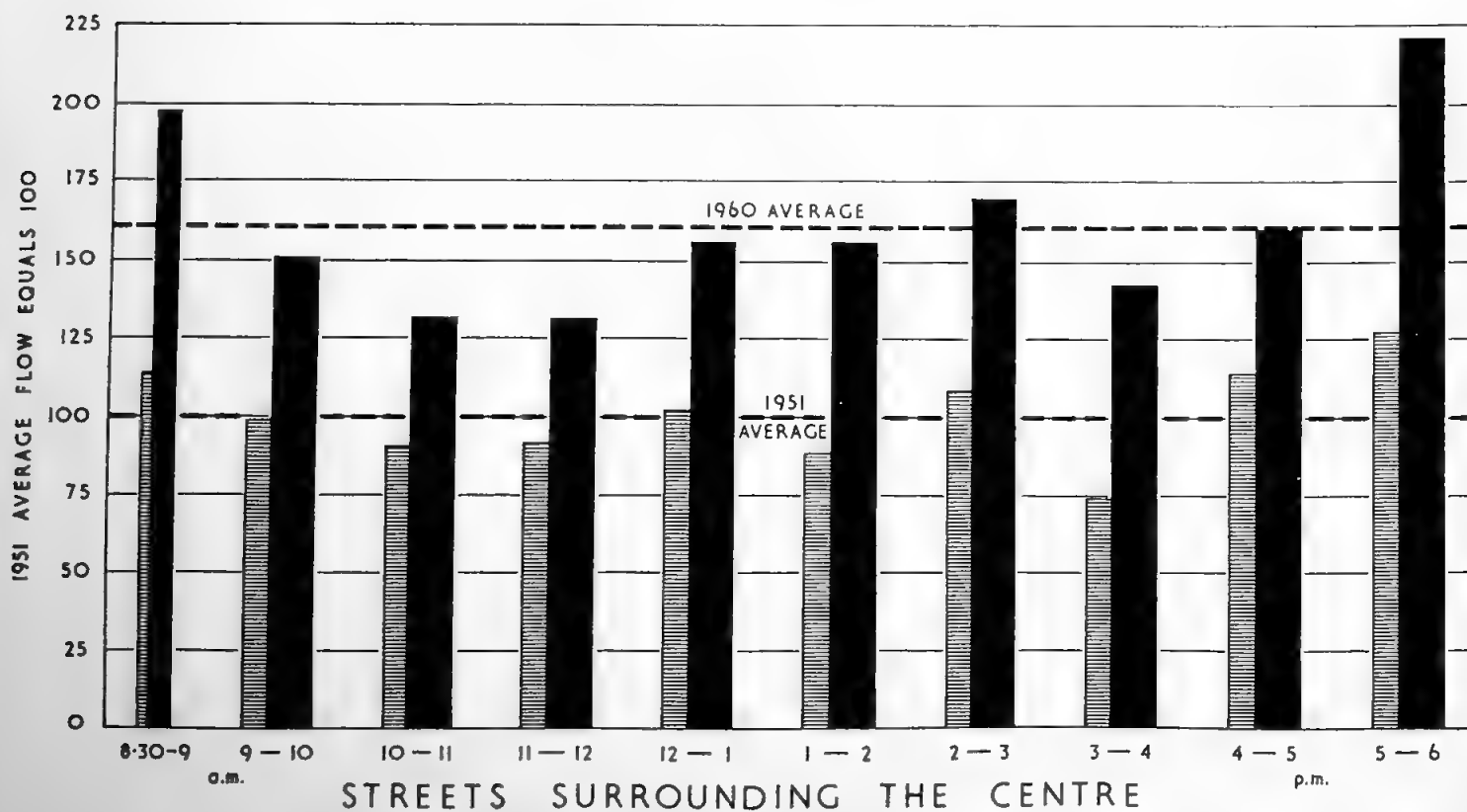
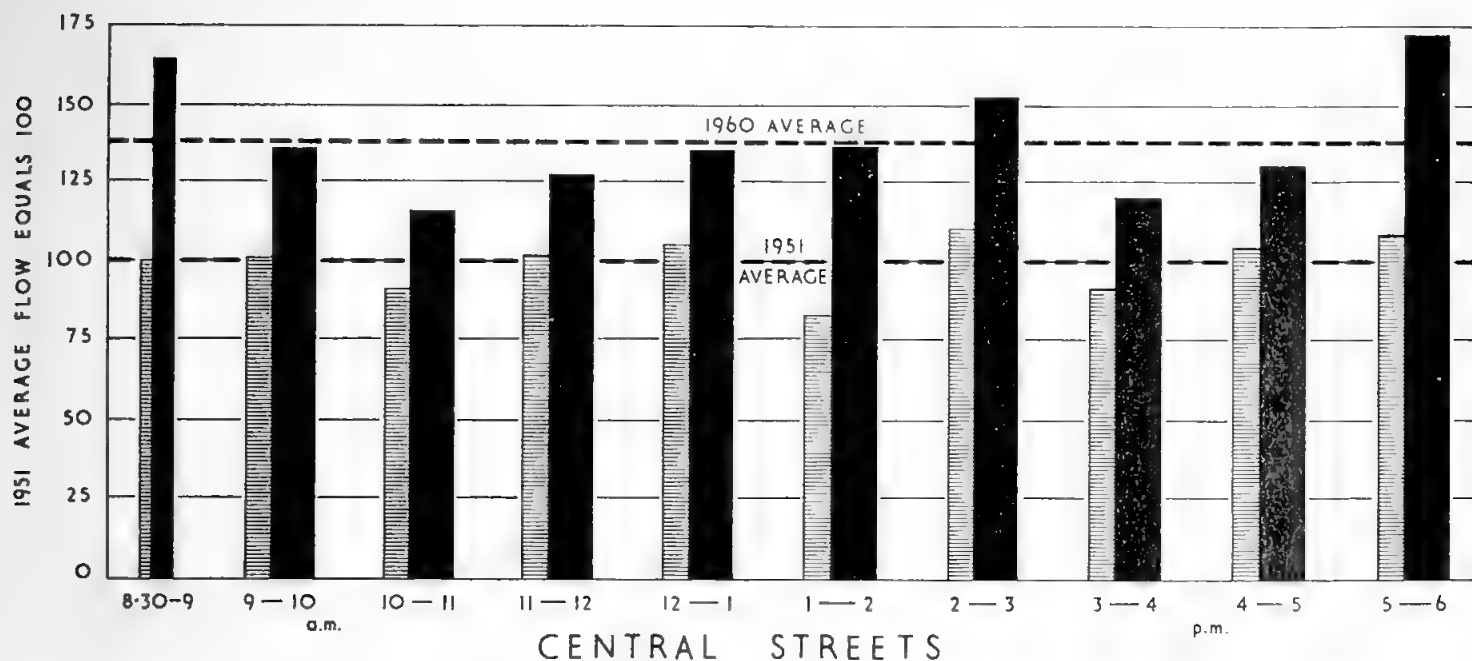


Figure 13 9-01

HOURLY VARIATIONS IN TRAFFIC FLOW 1951 AND 1960



1951

1960

Figure 14 (9-02)

DAILY VARIATIONS IN TRAFFIC FLOW 1960

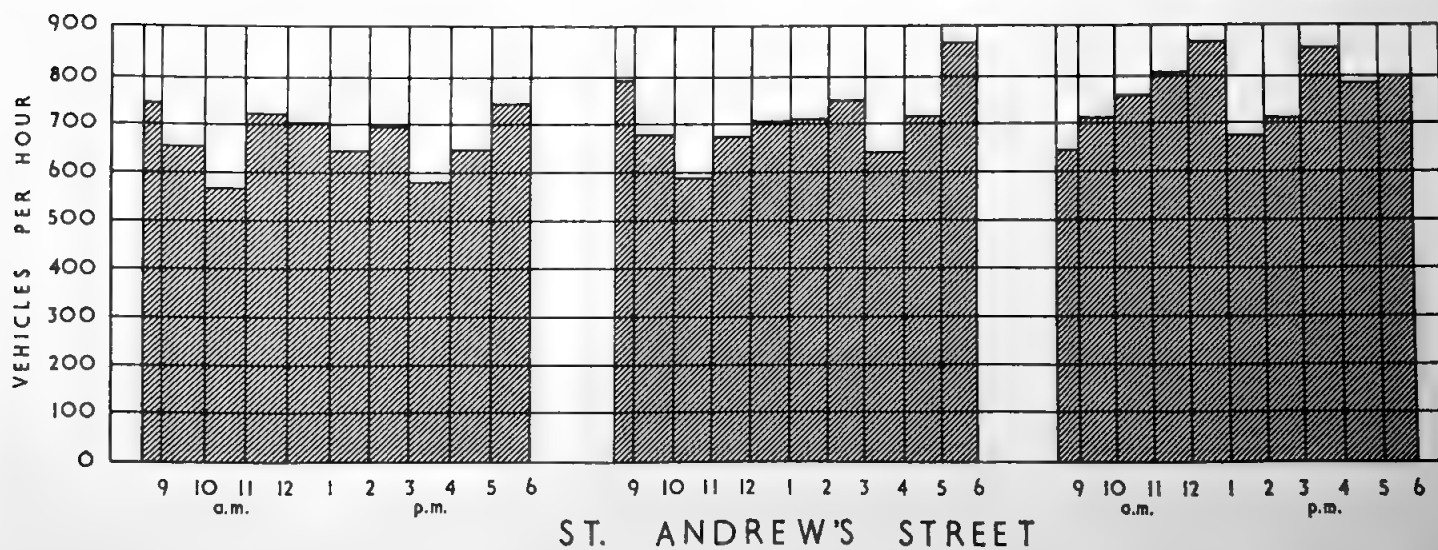
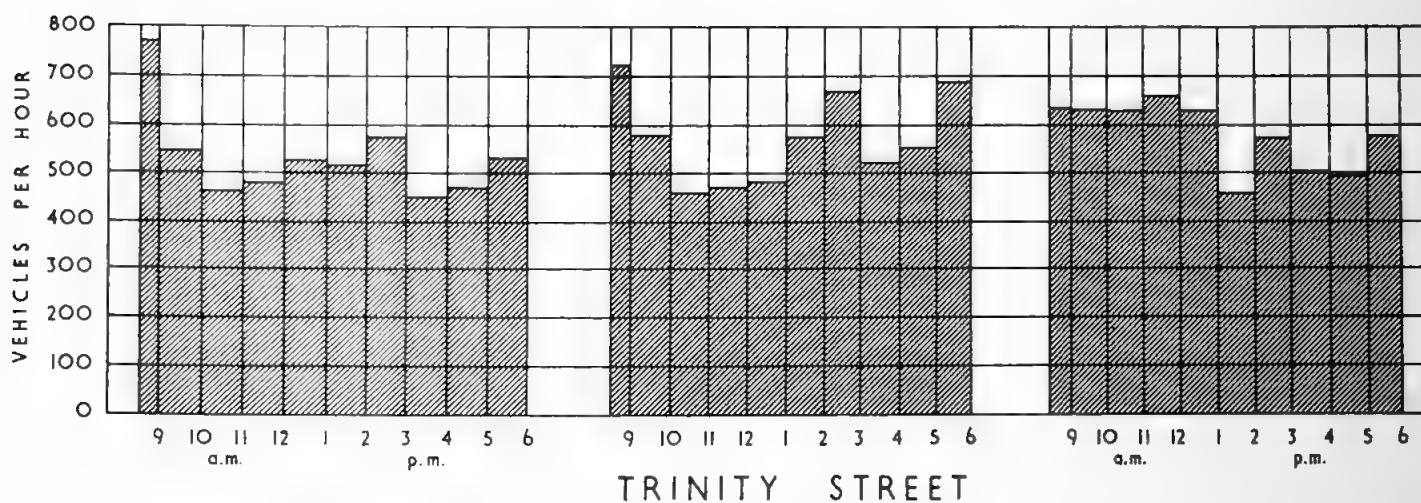
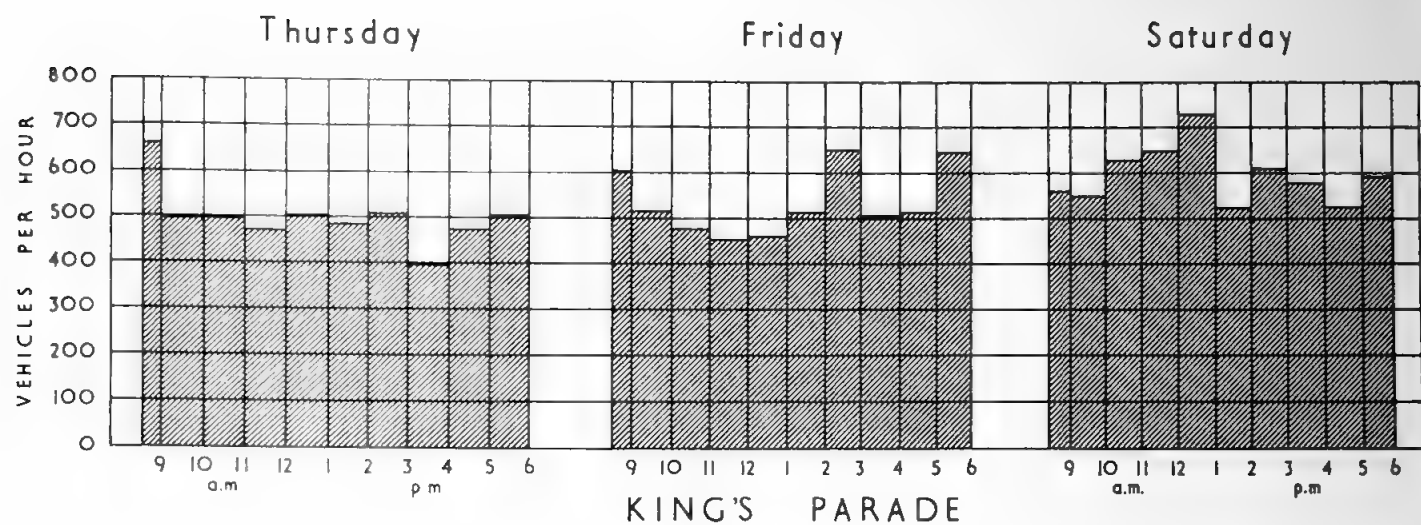


Figure 15 (9.05)

MAIN THROUGH TRAFFIC FLOWS

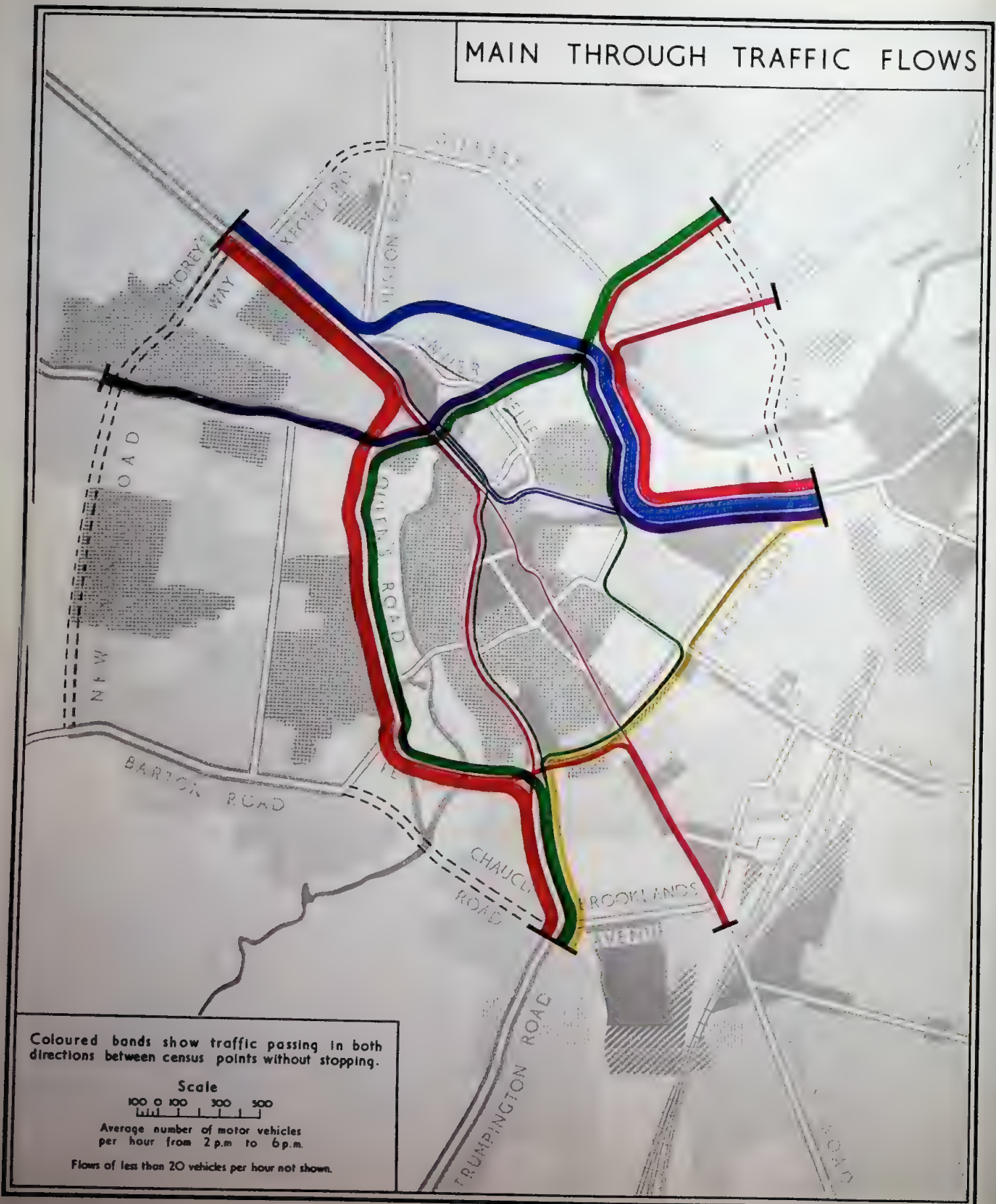
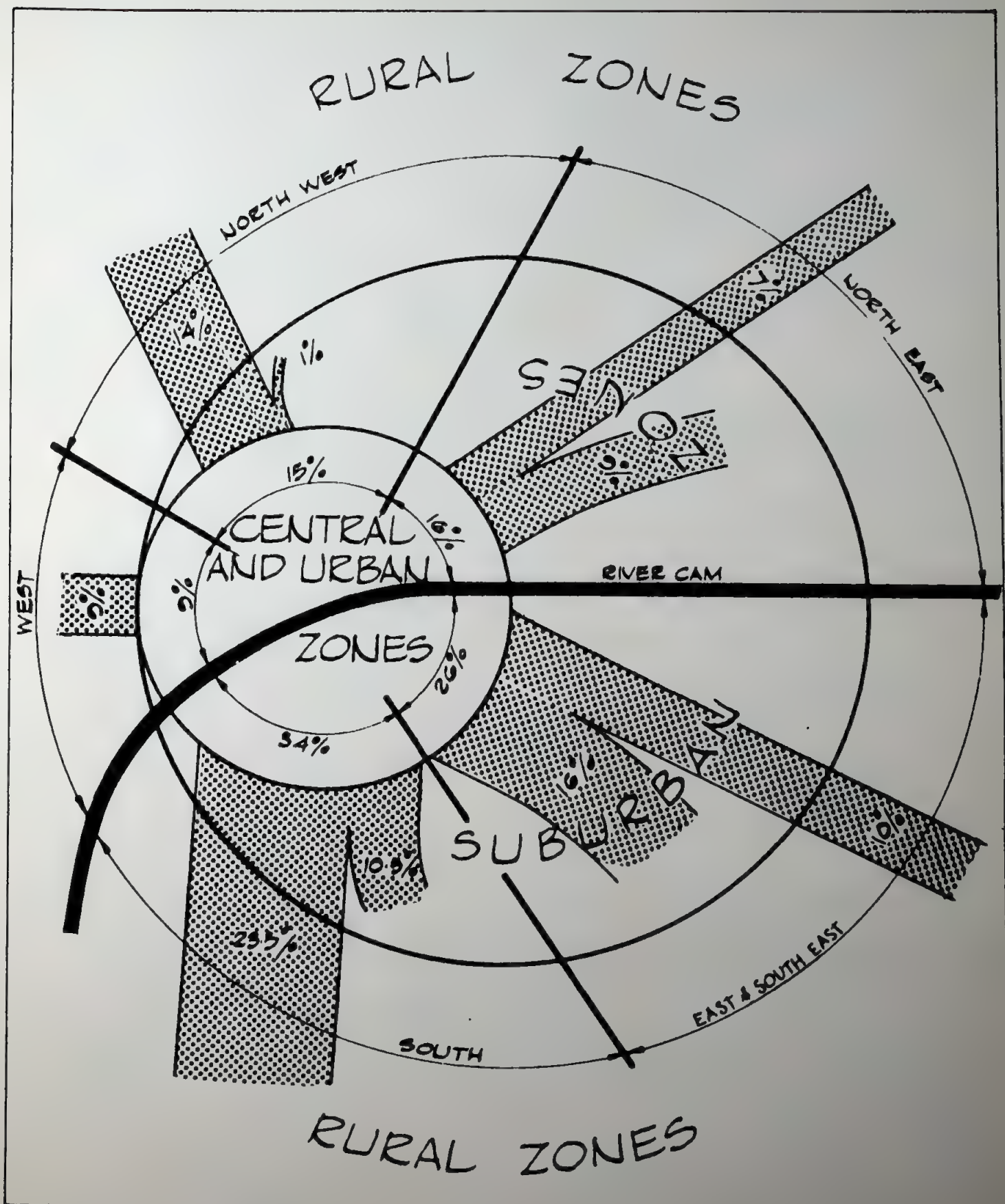


Figure 16 9-08



PATTERN OF STOPPING TRIPS TO CAMBRIDGE. Figure 17 9-11

CENTRAL AREA TRAFFIC FLOWS

Coloured bands show traffic entering at each census point and passing through the centre without stopping.

Black hatched bands show traffic stopping in the centre.

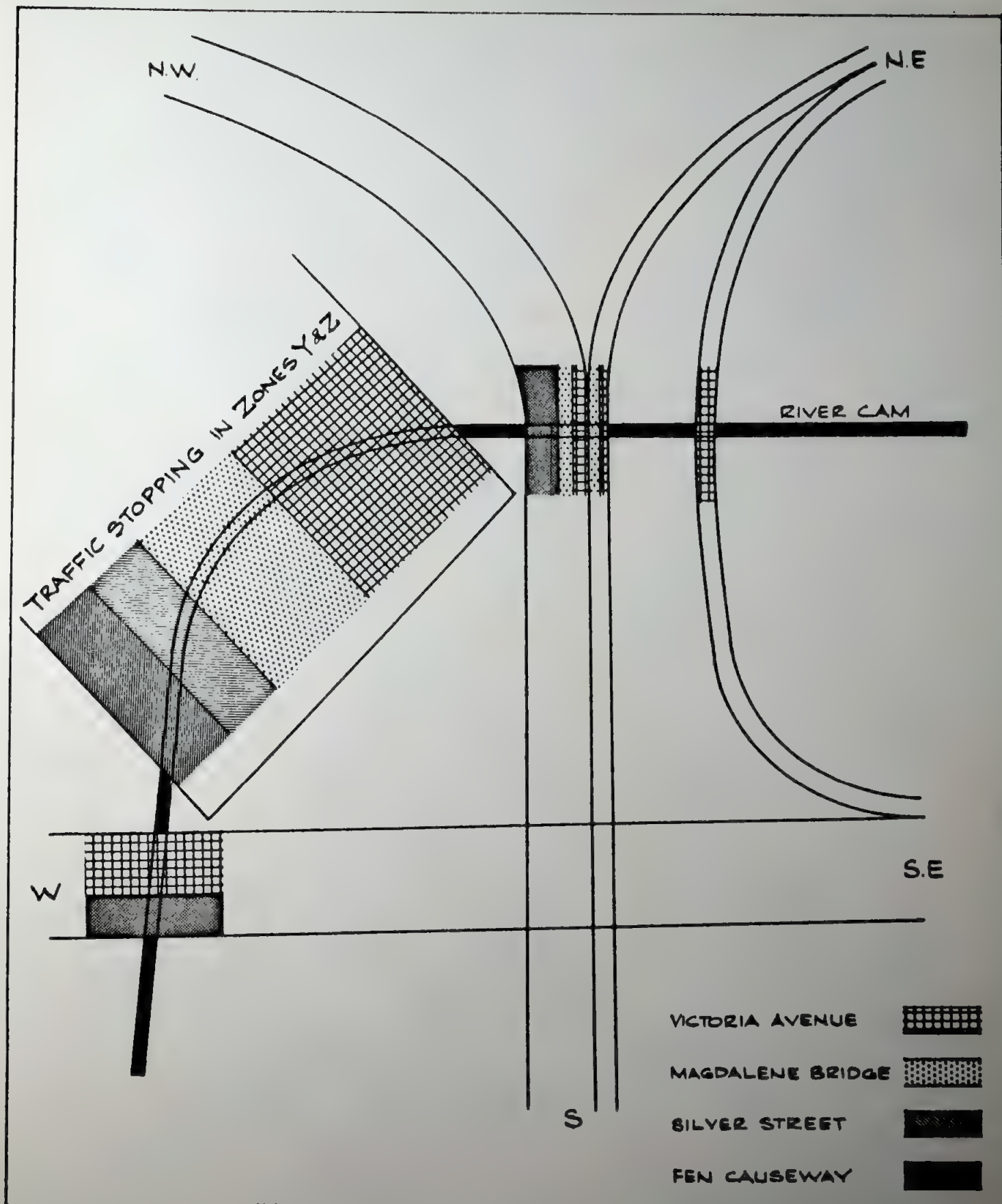
Scale

100 0 100 200 300 400 500

Average number of motor vehicles per hour from 2 p.m. to 6 p.m.

Flows of less than 10 vehicles per hour not shown

Figure 18 9.13



DISTRIBUTION OF RIVER CROSSING TRAFFIC Figure 19
9.24

DISTRIBUTION OF PARKED VEHICLE

THURSDAY OCTOBER 19th 1961

One parked vehicle - Private . . . Commercial . . .

Number of vehicles within private car parks . . .


Number of vehicles within public car parks . . .


Vehicles within authorised street parks . . .


Note: Position of parked vehicles shown diagrammatically

THURSDAY OCTOBER 19th 1961

One parked vehicle - Private. . . . Commercial. . . .


Number of vehicles within private car parks . . 


Number of vehicles within public car parks. . . 


Vehicles within authorised street parks, 

Note: Position of parked vehicles shown diagrammatically

One parked vehicle - Private. . . . Commercial. . . .


Number of vehicles within private car parks. . . 


Number of vehicles within public car parks. . . 


Vehicles within authorised street parks. 

Note: Position of parked vehicles shown diagrammatically




One parked vehicle - Private Commercial

Number of vehicles within private car parks 

Number of vehicles within public car parks 

Vehicles within authorised street parks 

Note: Position of parked vehicles shown diagrammatically

Number of vehicles within private car parks... 
 Number of vehicles within public car parks... 
 Vehicles within authorised street parks, 
 Note: Position of parked vehicles shown diagrammatically

Number of vehicles within public car parks . . .

Vehicles within authorised street parks

Note: Position of parked vehicles shown diagrammatically

Note: Position of parked vehicles shown diagrammatically

Figure 20 10-01

DISTRIBUTION OF PARKED VEHICLES

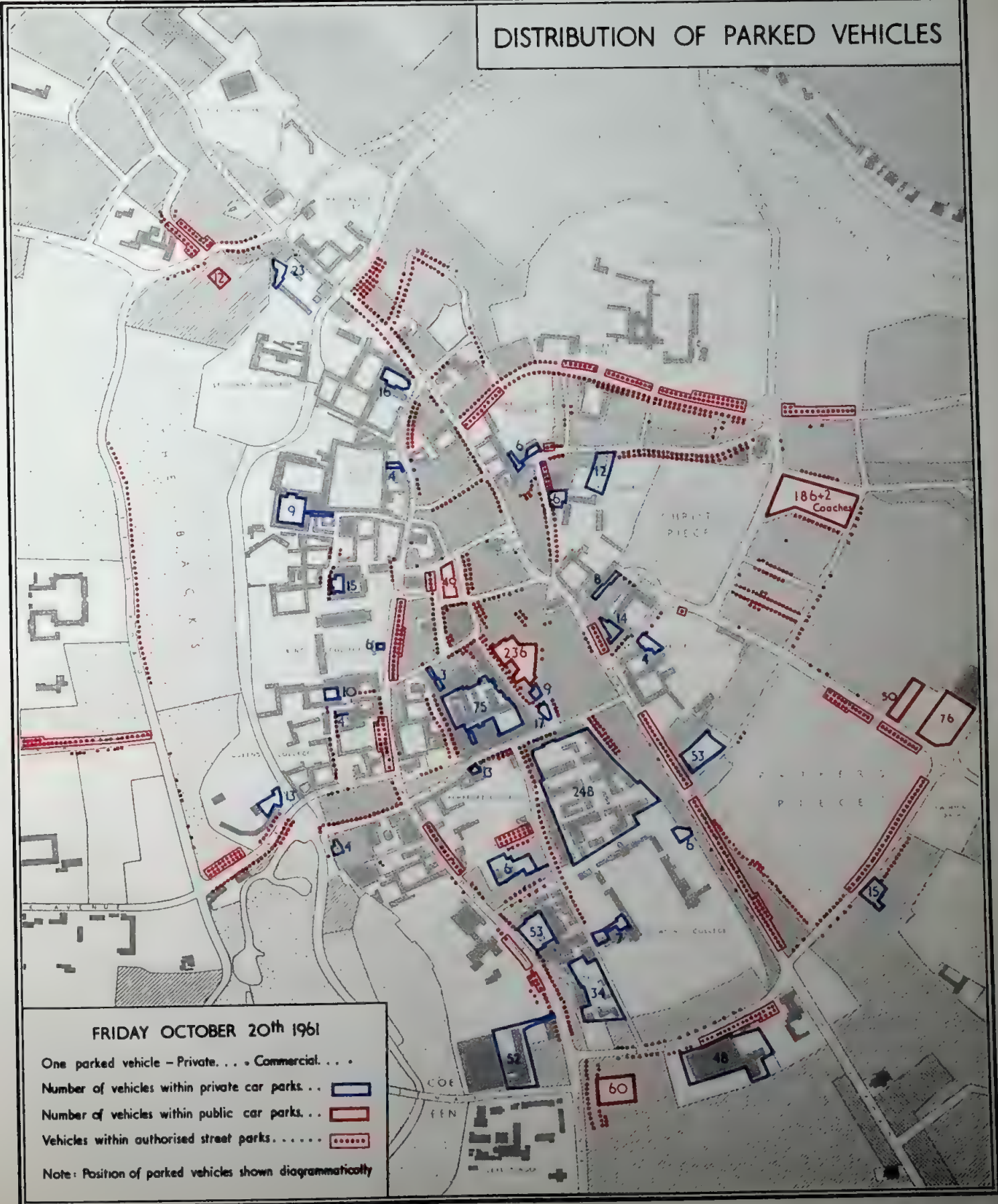


Figure 21 10-01

DISTRIBUTION OF PARKED VEHICLES



Figure 22 10-01

RELATIONSHIP PARKING VOLUME USAGE AND DURATION

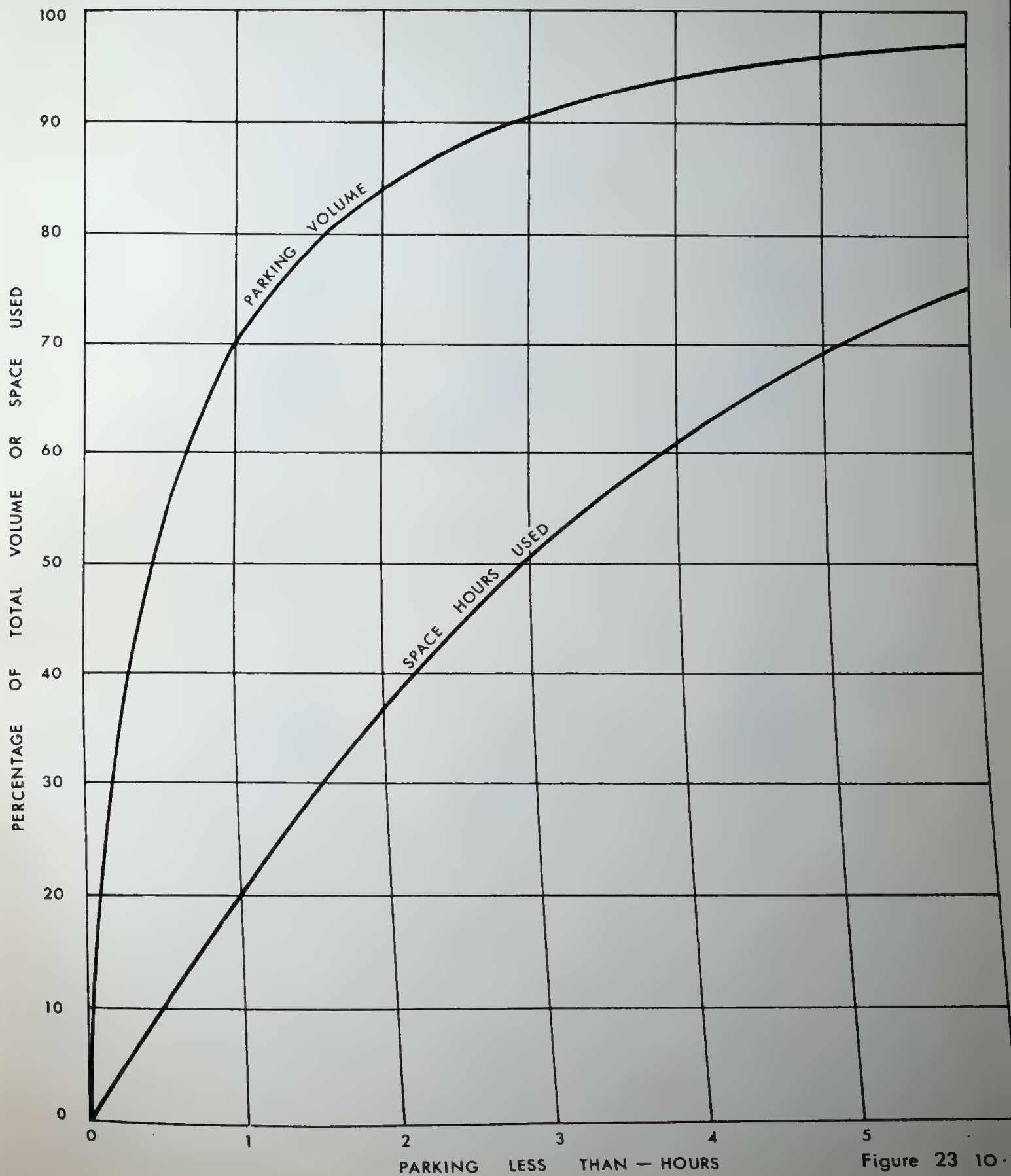
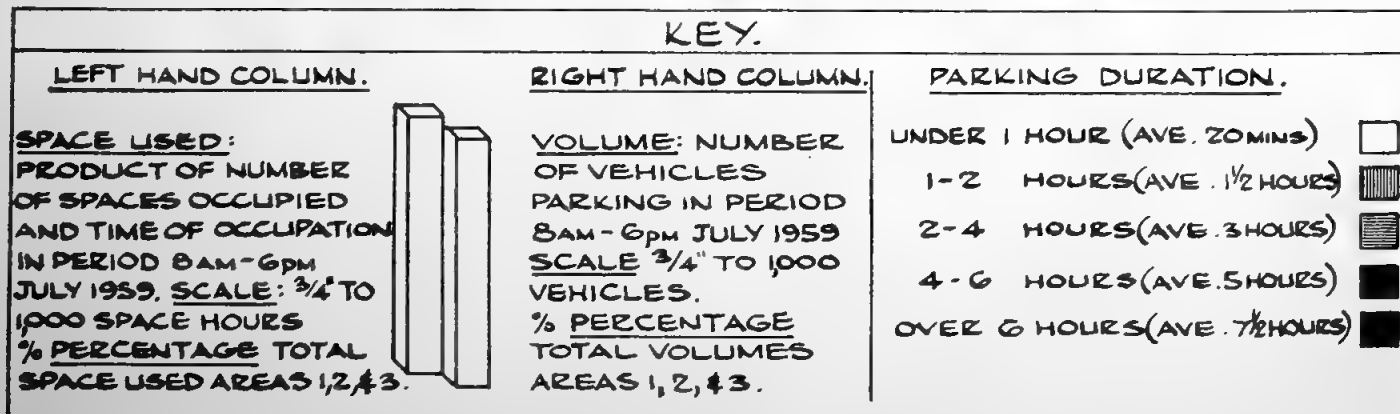
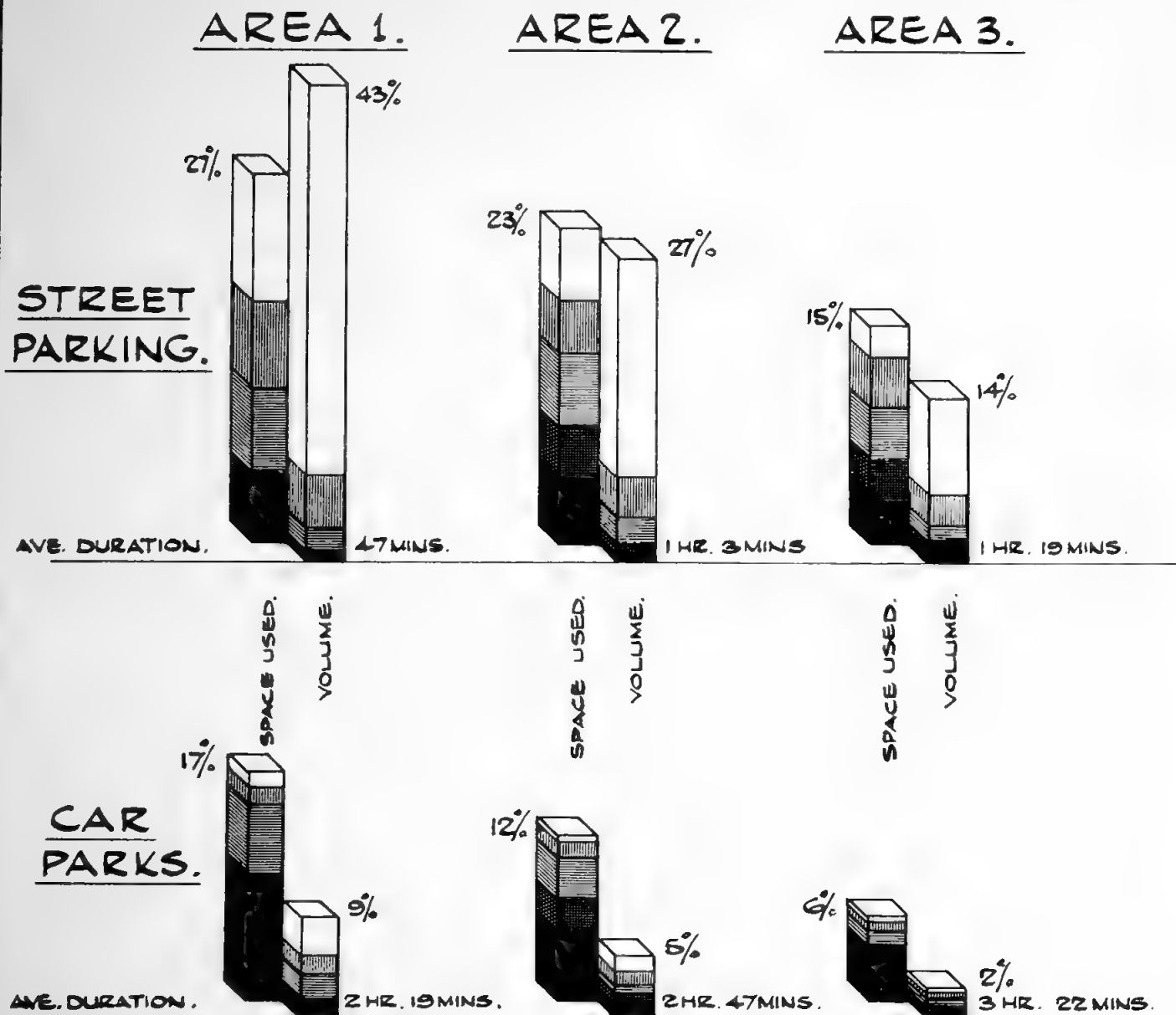
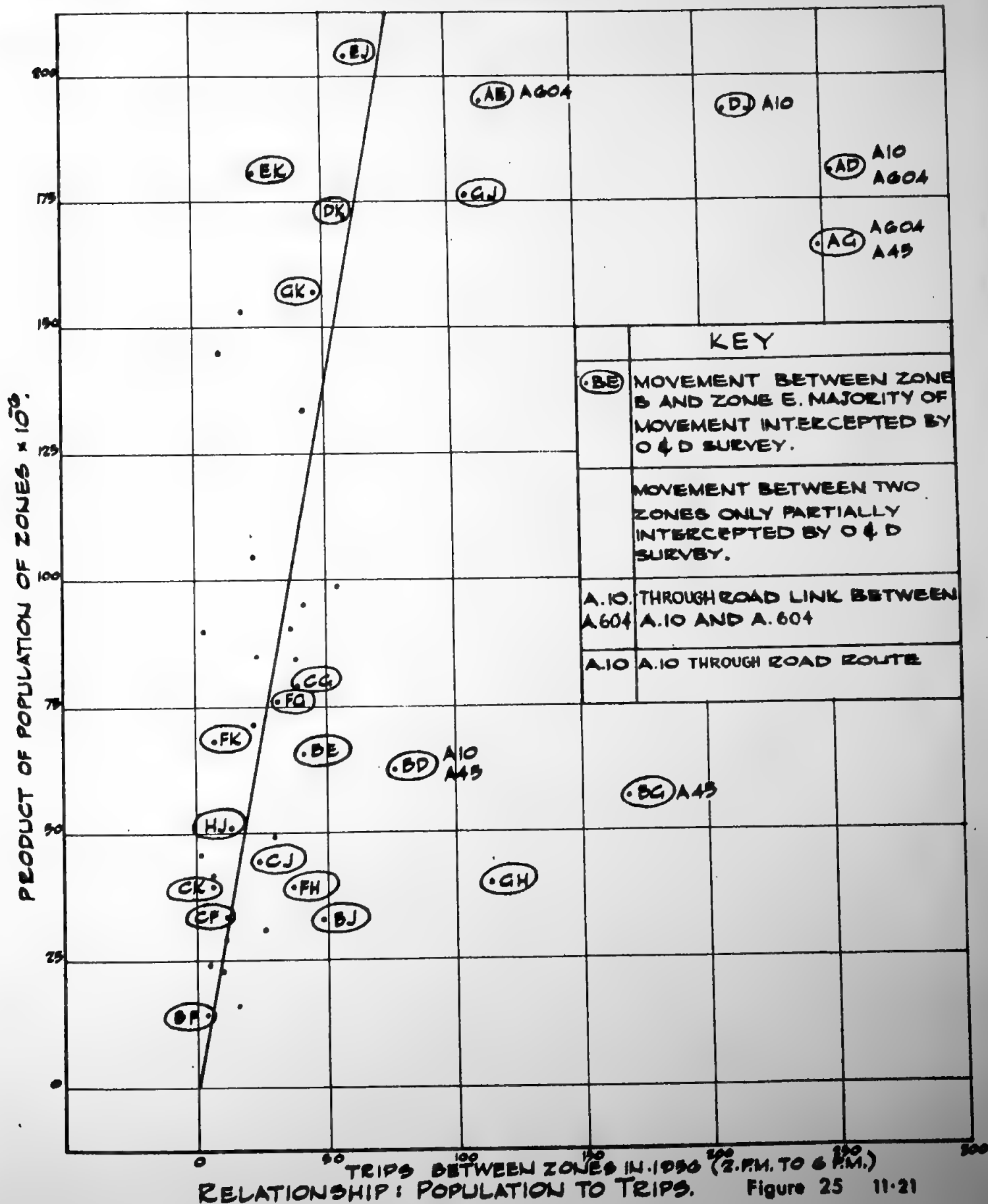


Figure 23 10



DISTRIBUTION PARKING VOLUME, SPACE USED AND DURATION.
 Figure 24 10-11



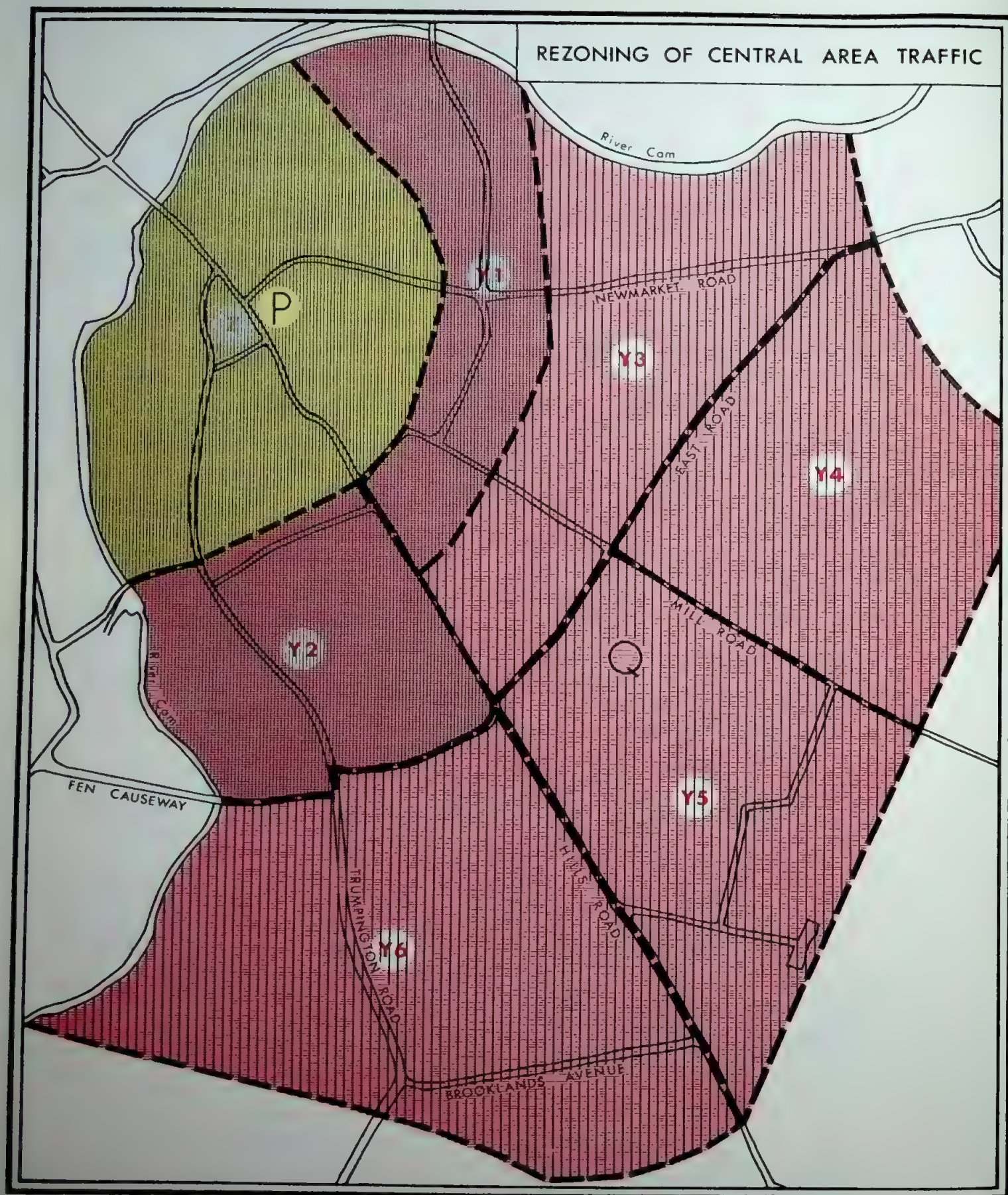


Figure 26 14-04

ZONE P SUB-ZONES



Park street car park only P1

Lion Yard car park Included in . . . P4

King street car park Included in . . P7

Figure 27 14.17

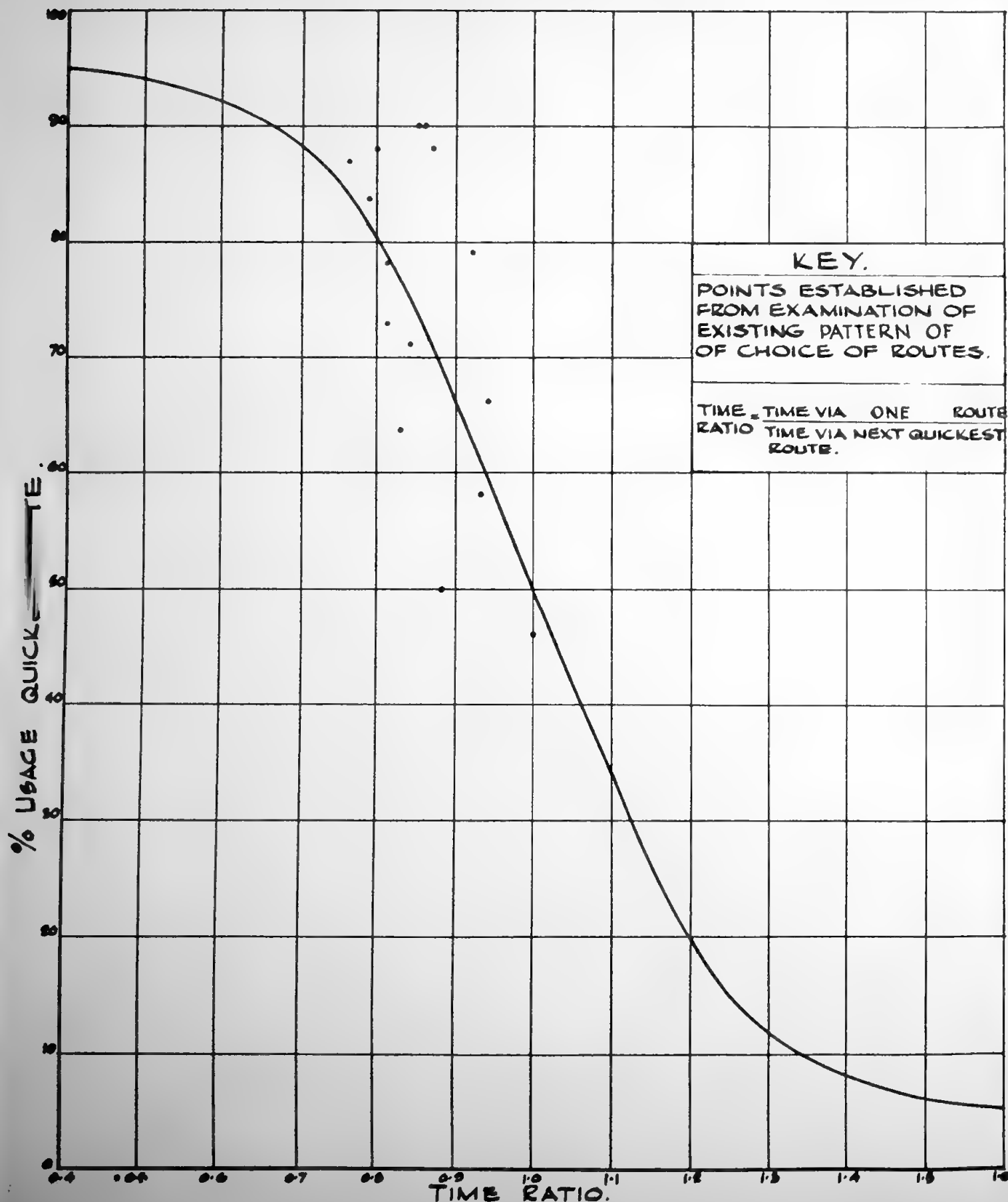


Figure 28 15-03 TRAFFIC ASSIGNMENT CURVE

DISTRIBUTION OF TRAFFIC



Figure 29 17-04

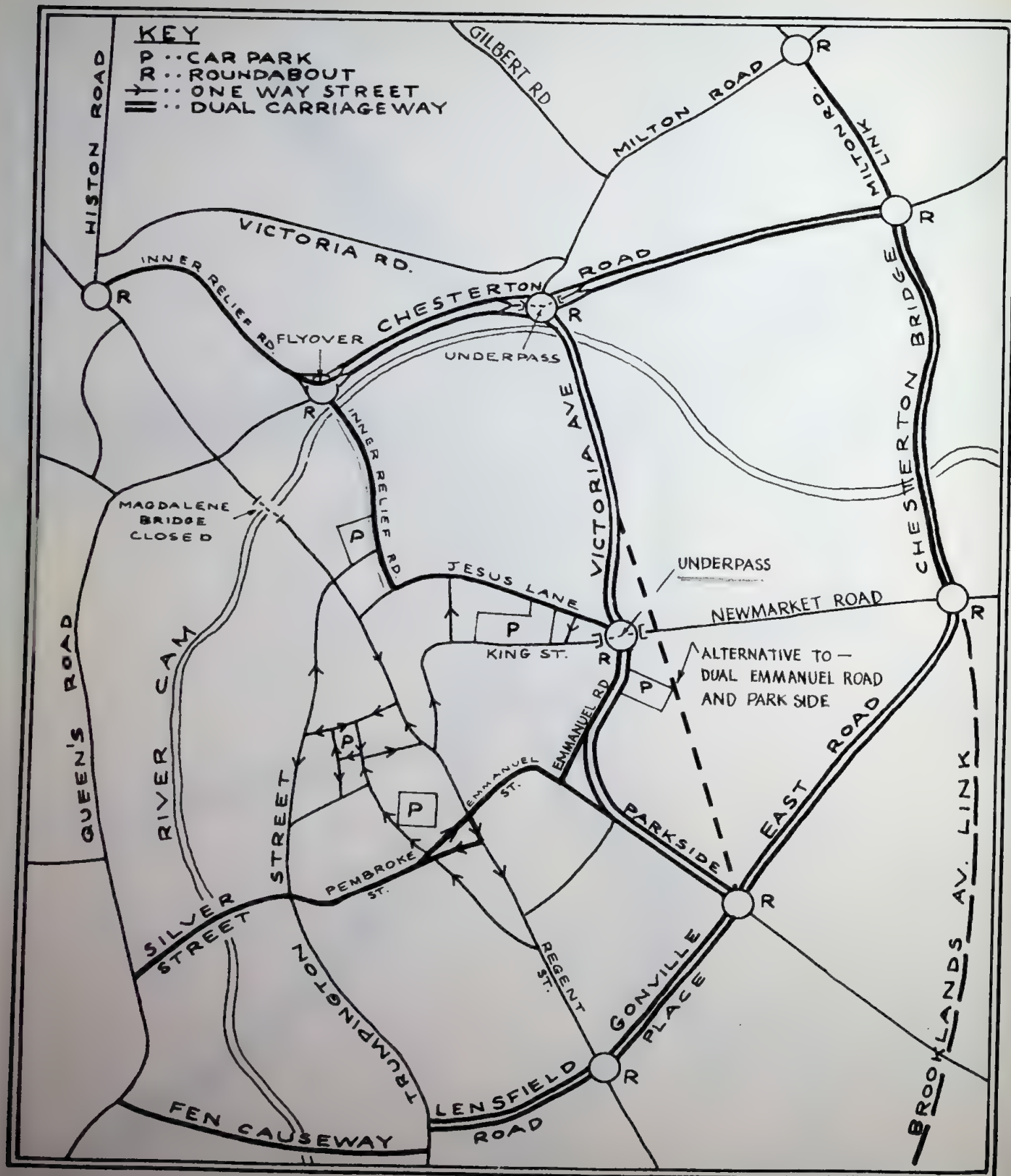


Figure 30 17.04

PHYSICAL FORM OF NEW ROAD SYSTEM

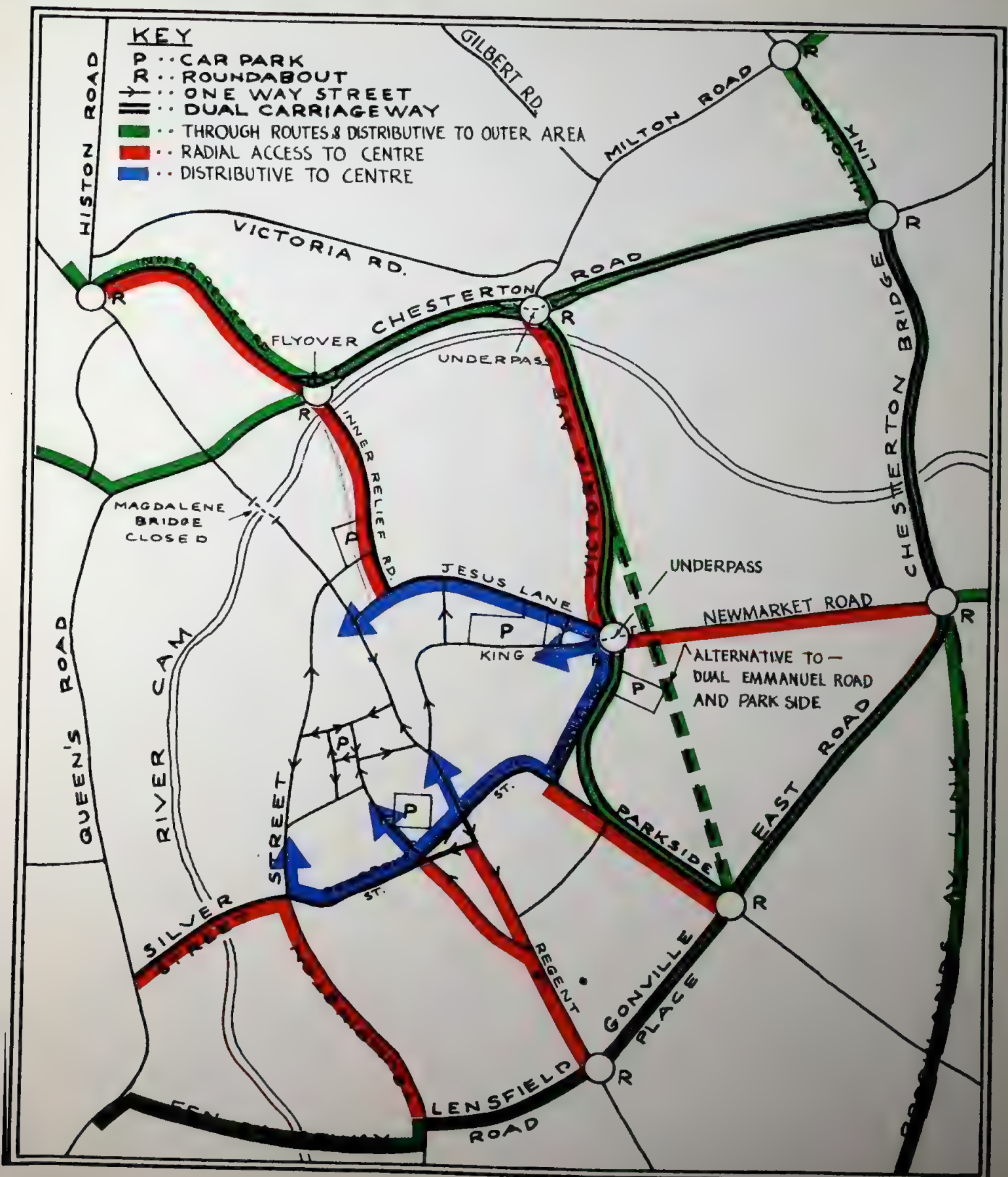


Figure 31 17-04

THE LINE OF THE RELIEF ROAD

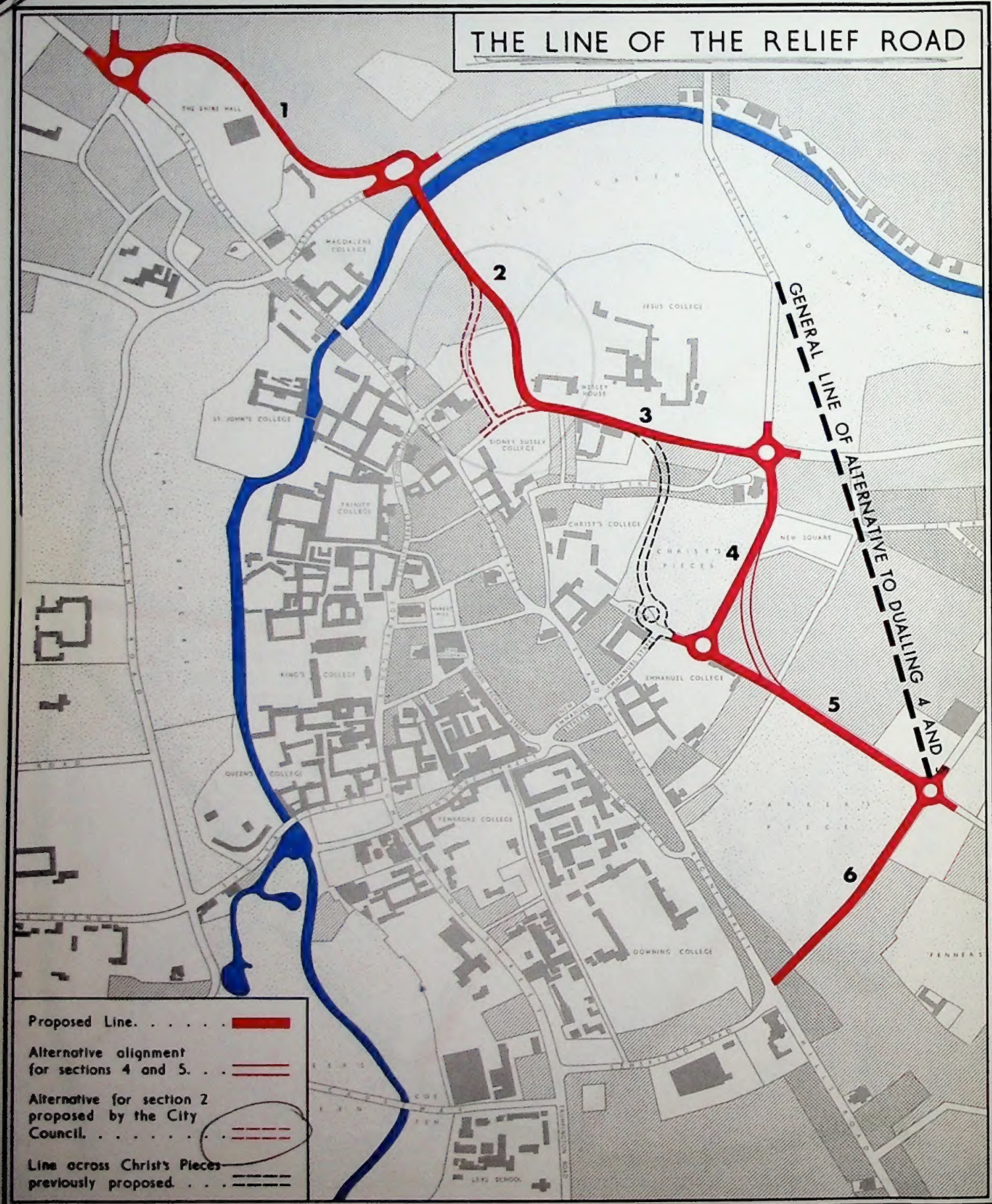
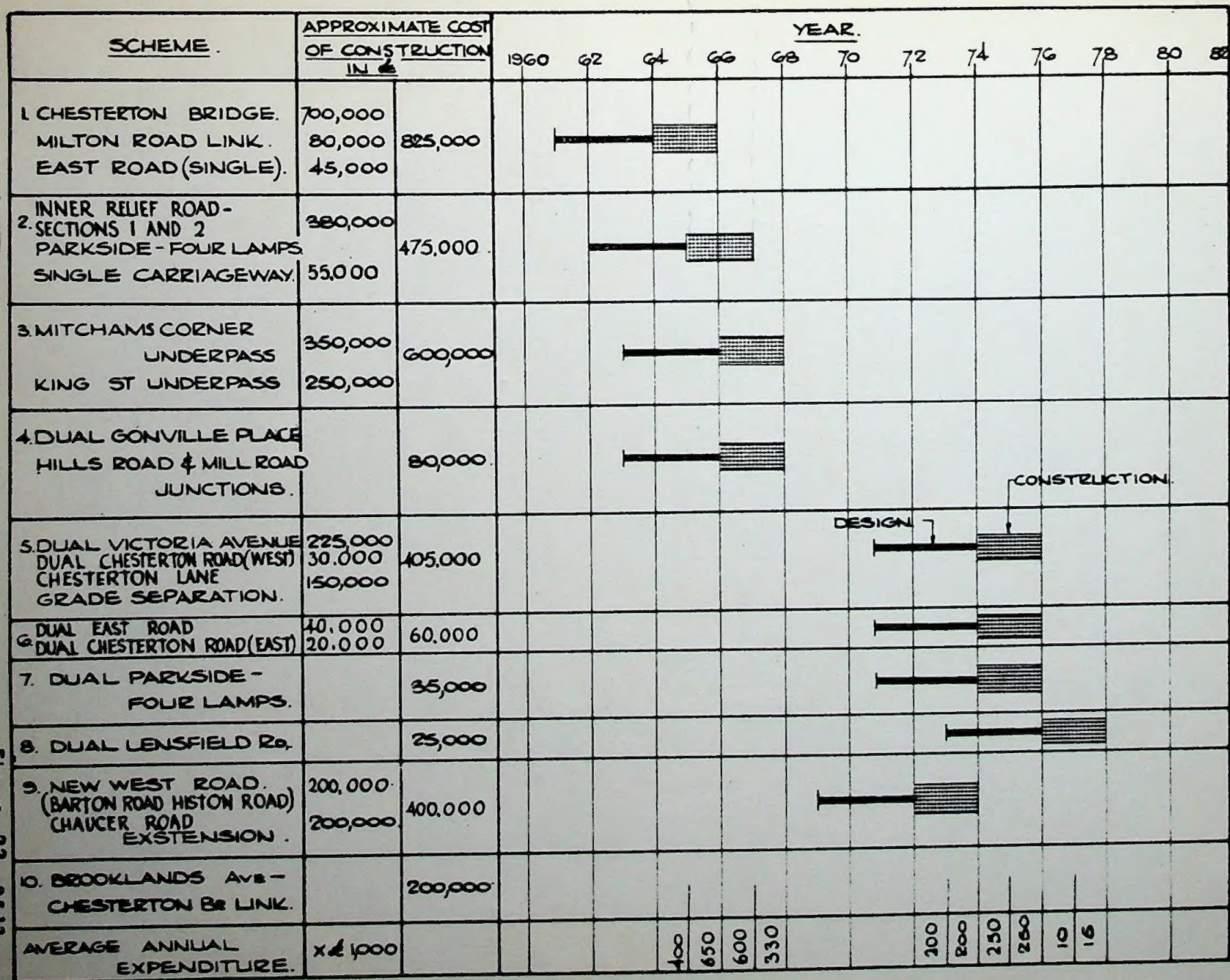


Figure 32 19-23



PROGRAMME & CONSTRUCTION COSTS

FIRST REVIEW OF THE CAMBRIDGE TOWN MAP

This study is one of a series made and now being published in connection with the First Review of the Cambridge Town Map.

These Papers will cover the following subjects:—

An appreciation of the Cambridge Traffic Plan.

Use and Floor Space Survey—the changing pattern of volume and use of Floor Space in the Central Area of Cambridge and the Fitzroy/Burleigh Street Area 1949—1961.

Summary of Shopping Survey—changes in Retail Sales and Services in the City of Cambridge 1949—1961.

An analysis of Retailing over the Eastern Region.

Survey of Employment in the Central Area of Cambridge 1962.

Studies leading to a more detailed policy for the Central Precinct of the City of Cambridge.

An economic study of the implementation costs of the approved plan for the Central Area of the City and the Counter Proposals of the University of Cambridge.

The changing aspects of Consumer Expenditure.

In addition it is intended to publish copies of evidence given at the Public Inquiry into objections to proposals for the amendment of the Plan for Cambridge at the First Review by—

- (a) the Planning Officer for the County of Cambridge.
- (b) the various public bodies, groups or individuals in support of the main principles of the Development Plan for the City of Cambridge.
- (c) objectors to the main principles of the Development Plan for the City of Cambridge.

